THE DESIGN AND EVALUATION OF THE ASTHMA KNOWLEDGE TEST FOR PARENTS AS A BRIEF E-HEALTH ONLINE INTERVENTION: PREDICTORS OF MOTHERS' ASTHMA KNOWLEDGE AND SELF-EFFICACY TO MANAGE CHILDHOOD ASTHMA

by

Erin-Leigh Gallop

Dissertation Committee:

Professor Barbara C. Wallace, Sponsor
Professor Robert E. Fullilove

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ABSTRACT

THE DESIGN AND EVALUATION OF THE ASTHMA KNOWLEDGE TEST FOR PARENTS AS A BRIEF E-HEALTH ONLINE INTERVENTION: PREDICTORS OF MOTHERS' ASTHMA KNOWLEDGE AND SELF-EFFICACY TO MANAGE CHILDHOOD ASTHMA

Erin-Leigh Gallop

This cross-sectional mixed-method study with a small sample of 62 mothers of children with asthma is a pilot evaluating a new brief online e-health intervention: **The Asthma Knowledge Test for Parents (TAKT-40),** *with all true answers*. The TAKT-40 was highly recommended (77.4%) by mothers to others parents with children with asthma. The sample had a *mean number of children of 2.31*, a *mean age of 39.13*, with 66.1% (n= 41) White, 24.2% Black, and 9.7% (n=6) Hispanic—with 88.7% living with a partner (n=55). The mean level of education was *between Some College and Master's degrees*, with 61.3% employed (n=38) and a mean annual household income for *between* $100,000 and $199,999. The mean age for children was 9.06, with a mean of 7.51 years since the asthma diagnosis, with 98.4% (n=61) prescribed medication, and 80.6% (n=50) currently taking it.

Suggestive of the TAKT-40 being a potential brief online intervention of value, paired t--tests showed: mother's self-ratings for level of knowledge were **higher after** they had taken the TAKT-40 with all true answers when compared to self-ratings of

knowledge before taking it; and, mother's self-efficacy for taking care of their child with asthma and helping their child achieve asthma control was **higher after** they had taken the TAKT-40 when compared to self-ratings after taking it.

While controlling for social desirability, backwards stepwise regression showed **(1) a higher asthma knowledge (on the TAKT-40),** was significantly predicted by: ***Higher*** *annual household income*; ***Lower*** *number of children;* ***Greater extent of negative impacts*** *from asthma on child, parent, and family*—30.0% of the variance predicted with this model. Secondly, backwards stepwise regression found **(2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors** was significantly predicted by: ***Fewer Barriers*** *to Child's Health Care*—with 60.0% of variance being predicted.

Qualitative data supplemented the quantitative findings, supporting the resultant implications and recommendations.

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To my son, **Rashaun**. Everything I do is for you. Never forget how much your mother loves you.

To Carol & Jim. Thank you for setting an amazing example of a life well lived.

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To Lisa and Laylah. Quite simply, I love you.

To Eileen. Your strength is infectious. Your children are luckier than they know.

To Shifali, please stick around.

To my cohorts. This is quite an achievement. I am proud of you all and one day soon, we will get to celebrate together.

To Dr. Barbara Wallace. It has been an absolute honor to learn from you.

To study participants and mothers of children with asthma. You are fighting your best fight. I only hope that this research helps to serve you in your noble work of keeping your babies breathing.

E.-L. G.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

Chapter I

INTRODUCTION

It is well-established that asthma is "the most common chronic childhood disease in childhood"—while associated with a decreased quality of life, as well as many direct and indirect "societal costs" (Pape et al., 2021). Contemporary research prioritizes a focus on factors that may be contributing to the public health concern of childhood asthma (Khreis et al., 2021; Kuang et al., 2021; Kulikova et al., 2021; Panisch et al., 2021; Saragondlu Lakshminarasappa et al., 2021)—as well as racial disparities in the prevalence of asthma, which disproportionately impacts African American children compared to White children in the United States (Alwan, 2021).

Globally, asthma impacts anywhere from 3% to 35% of the world's population, and 300 million people are estimated to suffer from the chronic pulmonary disease of asthma (Zarei et al., 2020). Thus, it is for good reason that childhood asthma remains an important contemporary focus for researchers (e.g., Akar-Ghibril et al., 2020, Kothalawala, et al., 2020; Lebold et al., 2020; To et al., 2020). This focus is more than justified, as asthma has long been the most common chronic disease of childhood (Mansour et al., 2000). Asthma "is a prevalent and chronic disease that significantly impacts the lives of increasing numbers of children and families each year" (Woodley, 2019, p. 191). Within the United States, the prevalence of asthma, as a chronic respiratory disease, continues to rise and "the burden of asthma extends to the child's family as well" (Woodley, 2019, p. 191).

The burden of the disease of asthma is vast, as 6.1 million children under 18 years of age were found to collectively have missed 10.5 million school days per year

(Woodley, 2019, p. 191). Asthma-related expenses are substantial, totaling $80 billion per year in economic costs; this includes "provider office visits, ED visits, inpatient hospital stays, mortality, and school and work absenteeism" (p. 191). It can be "stressful for parents when their children experience asthma exacerbations, and parental anxiety often ensues" (p. 192).

Orihara et al. (2010) characterized asthma as a chronic condition with a complex etiology and even more complex associated symptoms that are the result of environmental irritants, or triggers. Asthma includes underlying airway inflammation, smooth muscle hyperresponsiveness, and immunological reactions (p. 605). Due to the complex nature of asthma, "advances in therapeutic discoveries and developments have been limited" (p. 605). In turn, the precise roles of individuals suffering from asthma and their caregivers in the management of asthma symptoms present new challenges (p. 605).

The Goal of Achieving Asthma Control

Hammelmann et al. (2020) emphasized the importance of achieving *asthma control*, citing "the potential for asthma attacks, adverse effects of medications, and progression of the disease" (p. 233). These are contributing factors of "growing concern regarding the long-term outcomes in many cases of early and poorly controlled childhood asthma" (p. 234). Long-term negative health outcomes include but are not limited to "progression to severe asthma, irrecoverable loss of lung function, and chronic pulmonary disease (COPD) in later life" (p. 234). Asthma control is achieved through behaviors that "reduce asthma attacks, and prevent long-term adverse outcomes of childhood asthma" (p. 234). Maternal behaviors, such as "maternal smoking and second-

hand tobacco smoke exposure" not only may negatively affect lung function, but "strong harmful effects have been reported in children" (p. 234).

Asthma control can often be achieved via "health promotion measures, self-monitoring and self-care, taking bronchodilators as soon as symptoms start," and "taking other maintenance medications on a regular and timely basis" (Woodley, 2019, p. 194). Avoidance measures, such as circumventing "triggers that can precipitate an attack" are also encouraged (p. 194).

Home and Environmental Factors in Asthma

As per Hauptman et al. (2019), many studies have shown that "airborne pollutant, aeroallergens and mold exposures, in the inner-city home environment, are associated with significant childhood asthma morbidity" (p. 4). Chronic exposure to major highways has been associated with an "increased risk of respiratory infections and asthma development in children" (p. 4). The environment directly outside of the home, including "proximity to traffic at both their homes and schools" also plays a key role in asthma outcomes (p. 4). A child's home and school proximity to major roadways is significantly associated with "increased asthma symptom days, health care utilization and poor asthma control" (p. 14).

Wing et al. (2015) discussed the "parental concern for neighborhood safety" and the "correlation with asthma prevalence in children" (p. 379). A child's "exposure to neighborhood violence could be an important factor in the occurrence of childhood asthma" (p. 379). Further, dysfunction within the home can be a significant source of psychosocial stress for children (p. 379). These events can cause a child stress, and

"stressful life events can increase the onset of asthma" –-as "exposure to stress" was found to predict greater asthma morbidity in children (p. 383).

Sato et al. (2013) emphasized how "culture, other social factors (e.g., cultural stress, language barriers, discrimination, racism), and factors associated with poverty (e.g., neighborhood stress) contribute to ethnic group differences in levels of stress and home-based environment conditions" (p. 165). This is worth noting because "home environment matters in family asthma management, even after accounting for socio-economic disadvantage" (p. 166). The management of childhood asthma is "embedded within the context of parent-child relationships" (p. 165). The environment at home "is a significant predictor of family asthma management" (p. 165). Non-asthma-specific behaviors may provide insight to family adherence to asthma management. As per the summary of Sato et al., the following may be said about the importance of the family system as an indicator of potentially successful pediatric asthma management:

> …[A] provider could learn more about the child's home environment by directly asking the child and caregiver about the child's experiences with self-care routines (e.g., whether the child is responsible for non-asthma self-care routines such as bathing and brushing teeth, as these daily self-care behaviors may provide a foundation from which to build asthma-specific self-care via medication adherence) or by asking the child and caregiver about qualities of the parent-child relationship (e.g., whether the child experiences their parent as supportive overall)…. (p. 165)

Additionally, Sato et al. noted how "a highly structured and supportive home environment with routines and expectations for the child, may facilitate the family's adherence to manage asthma and adherence to daily asthma medication" (p. 165).

As mentioned earlier, what occurs in the home environment may be highly significant for exposure to maternal smoking and second-hand tobacco smoke exposure.

As a consequence, there are “strong harmful effects” for children so exposed (Hammelmann et al., 2020, p. 234).

Other Factors Related to Asthma in Children

Among the other factors found to be related to childhood asthma, Trivedi and Denton (2019) identified both maternal and paternal histories as important in determining the severity of the manifestation of asthma symptoms in children. Specifically, “both maternal and paternal histories of asthma are associated with increased risk of asthma in offspring” (p. 2). Some 80% of cases of asthma “begin during the first 6 years of life” (p. 2). Prenatal behaviors such as maternal smoking behaviors and diet serve as risk factors (p. 2). Preterm birthdate (23–27 weeks’ gestation) “is associated with an increased risk of asthma into young adulthood” (p. 2). Cesarean birth and low birth weight are also “associated with asthma diagnosis in mid-childhood with symptoms persisting into adult life” (p. 2). The sex of the child is also important, as prior to puberty boys have smaller airway size and are therefore “more likely to develop childhood asthma, as compared with girls” (p. 2).

Trivedi and Denton (2019) explained that “asthma symptoms are not restricted to the confines of a “singular disease, but rather a uniquely diverse disorder with variable presentation throughout childhood” (p. 1). Asthma symptoms are characterized by “inflammation leading to bronchoconstriction, edema, and increased mucous production in the airways” (p. 1). Asthma symptoms present differently in children than in adults with childhood severity being associated with “asthma duration, medication use and lung function” (p. 10). Due to the variability of manifestation of symptoms, it takes an average “3 years to control and stabilize asthma episodes” (p. 3). The years following diagnosis

are crucial for appropriate management of the disease and "the frequency of asthma episodes soon after diagnosis points to the need for attentive follow-up and aggressive management and education strategies in the early years" (p. 3). Because of the vast differences between childhood and adulthood asthma, "approaches to severe asthma in adults should not be extrapolated to children" (p. 10).

Asthma symptoms are known to manifest with varying levels of severity in response to a wide range of stimuli (American Academy of Allergy and Immunology [AAAAI], 2004). Stimuli include but are not limited to hot or cold weather, scents, odors, exercise (AAAAI, 2004).

According to Poole et al. (2019), "weather changes closely interact with air pollution to represent a major challenge that can affect the health of asthmatic patients" (p. 1706). Due to the flooding of indoor environments after severe storms, "allergen and respiratory health hazards" result, and the "incidence of asthma development" may also be affected (p. 1706). Environmental factors including "increased duration of pollen seasons, increased amount of pollen produced by plants, and possibly increased allergenicity of pollen" all have an affect on asthma sufferers (p. 1704). Further, the behavioral aftermath of severe weather conditions directly affects low SES (socioeconomic status) communities and resulting community-wide behaviors; and, the resultant factors may include "increased use of diesel or gasoline-powered generators, high mold counts, and increased problems with rodents and cockroaches in damaged homes" affect asthma severity (p. 1706). Of note, climate "and weather patterns will continue to change;" and, "new difficulties will likely emerge that could affect asthma and allergies" (p. 1708).

Poole et al. (2019) further identify mosquito control behaviors as potential sources of asthma-worsening conditions (p. 1706). Mosquito repellants are a "potential emerging indoor pollutant" and are associated with "an increase in respiratory symptoms, including asthma, in persons exposed to mosquito coils" (p. 1706). Burned repellants are a source of indoor pollution, which "can increase the frequency of emergency department visits and hospitalizations for asthma" (p. 1706). Indoor pollution is also known to "increase the incidence and development of asthma, and act as an adjuvant to potentiate the development of pollen allergy" (p. 1706). Interventions that emphasize nutritional importance in asthma care may prove beneficial as "dietary and/or nutritional supplements might be somewhat beneficial with helping protect against air pollution–induced respiratory damage" (p. 1708).

Others have identified the potential role of mental disorders, or psychiatric symptoms in asthma control and asthma outcomes. Specifically, numerous authors have focused on links between symptoms of anxiety and depression and worse asthma outcomes, in terms of asthma control (Kaas et al., 2021; Kulikova et al., 2021; Saragondlu Lakshminarasappa et al., 2021). Kaas et al. (2021) extended the body of literature on links between childhood asthma and depression and anxiety by also documenting links between childhood asthma and attention deficit disorder with hyperactivity (ADHD). Others have documented links between children having had Adverse Childhood Experiences (ACE) and the outcome of childhood asthma (Panisch et al., 2021; Pape et al., 2021).

Urban Minority Children of Color and Racial Disparities

Asthma prevalence rates among children from urban, minority, and low-income backgrounds have been reported to be "from 10% to 20%," whereas the "prevalence for US children is 6%" (Mansour et al., 2000, p. 512). The reasons for the disparity in rates of asthma are not apparent, however "some studies report that risk factors such as race, income, and insurance status affect access and quality of health care services" (p. 512). Alwan (2021) focused on race as a factor, finding African American children (22.9%) had a much higher prevalence than White children (13.1%) in the US.

The burden of disease was found to have increased for "children from disadvantaged backgrounds" as they "experience a multitude of environmental factors that worsen their asthma severity"—which in turn affect their family's efficacy in asthma management (Woodley, 2019, p. 192). Potential sources of negative influences on health outcomes include "building structures and their state of repair, neighborhood infrastructures of roads" and "availability of green spaces and recreational activities" (p. 192). Minority families often "reside in buildings in disrepair and be exposed to higher levels of allergens, such as mold, dust, cockroaches, and rodents" (p. 192). This increases their home exposure to environmental triggers. Another barrier to proper asthma management discussed is the "accessibility of local health care providers" (p. 192).

Mitchell et al. (2016) indicated that "African American children should be treated by specialists at a higher rate than whites," while emphasizing the increased clinical severity of asthma for African Americans (p. 64). African American children suffering from asthma are simply "sicker" than white patients (p. 66). Further, "understanding

which children present for specialist care will be useful for informing referral and follow-through policies to improve receipt of such care" (p. 64). The lack of sufficient recognition of phenotypes, or risk factors, including exercise-induced wheezing, may play in role in the underestimation of the severity of disease. Both parents and physicians may contribute to this issue—with parents potentially not communicating properly with primary care providers; and, with providers not practicing cultural competency. A potential factor in the disparity in severity of asthma symptoms between African Americans and whites may be further explained, at least in part, by the complex nature of asthma symptoms with the clinical manifestation of daytime symptoms being distinctly different from the clinical manifestation of nocturnal symptoms (p. 65). It is recognized that "receipt of asthma specialist care can improve those outcomes that are disparately experienced by African American children" (p. 64).

As per Woodley (2019), minority families experience a decreased ability to navigate the health care system compounded with limited access to health care resources (p. 192). Challenges related to logistical issues, such as transportation to and from health care providers, also affect African American families at a higher rate (p. 192).

Mansour et al. (2000) indicated that, in order "to improve asthma management and health outcomes for urban, minority children with asthma, it is critical to tailor education about asthma and its treatment, and address quality of life issues for both children and parents" (p. 513). Health care provider characteristics are also relevant, while additional factors include a "lack of continuity" in care, the "availability of providers, and limited hours of operation" (p. 513). Each of these may contribute to

disparities affecting health outcomes for children from urban, minority, and low-income backgrounds (p. 513).

Asthma disproportionately affects African American families (Brown et al, 2017, p. 1). African Americans "have higher rates of asthma prevalence, morbidity, and mortality in comparison with other racial groups" (p. 1). African Americans with asthma experience more severe symptoms of the disease. The burden of asthma on families that is experienced by "urban US populations may be largely explained by demographic factors such as race" (p. 2). "African Americans may predispose to more severe or difficult to control phenotypes" associated with asthma (p. 2).

Challenge of Nocturnal Asthma

The reality is that childhood asthma is associated with children being "more awake during the night" and being absent more often from school (Zarei et al., 2020, p. 1135). Of all the chronic diseases, asthma has the greatest association with school absenteeism, or educational disruption in order to receive care for asthma (Zarei et al., 2020).

While anti-inflammatory treatment and bronchodilators "relax airway smooth muscles greatly improve asthma symptoms," the "nocturnal worsening of asthma occurs even in patients under optimal medication treatment" (Francisco et al., 2018, p. 2). The nighttime worsening of symptoms "is common in more than two-thirds of asthma patients" and "is associated with more severe asthma symptoms," in addition to already burdensome daytime symptoms (p. 2). Daytime symptoms refer to the "fragmented sleep, daytime fatigue, and impaired cognitive performance" which result in poor quality of life (p. 2). The "nocturnal worsening of asthma symptoms is a common feature of asthma"

(p. 1). Patients experiencing nighttime worsening of symptoms have physiological abnormalities that result in "increased airway inflammation and decreased steroid responsiveness, increased pulmonary capillary blood volume, functional differences in blood/air volume ratios and mechanical coupling of the parenchyma to the airways" (p. 2). To reduce the severity of nocturnal symptoms, "physical exercise for at least 6 weeks, twice a week" is suggested (p. 12). It is also suggested that "aerobic physical exercise may improve nocturnal asthma in children and adults by reducing the prevalence and frequency of nocturnal symptoms" (p. 13). However, it is also noted that "there is no standardized questionnaire to evaluate nocturnal symptoms in asthma" (p. 13). The exact mechanisms "related to nocturnal worsening of asthma remain unclear" (p. 13).

The nocturnal symptoms of asthma are characterized by night-wakings, parasomnias, and sleep disordered breathing (Fagnano et al., 2011, p. 2). Among children with asthma, sleep disturbance due to nocturnal symptoms can greatly influence health and wellbeing, and may contribute significantly to their disease burden (p. 2). The symptoms experienced by children with asthma may fall out of the range of the clinical definition of sleep disorders—so that they are consequently likely to go underreported by parents (p. 2). Many parents underreport their children's and their own sleep difficulties to primary caregivers. As a result, the full burden of nocturnal symptoms of asthma may not be recognized by the family or primary care providers (p. 7). This is unfortunate because "understanding the burden of nocturnal asthma symptoms and poor sleep quality is important in understanding the total impact of asthma on the child and the family" (p. 2). Nocturnal asthma symptoms are associated with school absences as well as poor school performance. Family members experiencing sleep disturbance as a result of a

child's nocturnal symptoms may experience increased daytime fatigue and negative mood (Fagnano et al., 2011).

Medication Adherence

Mansour et al. (2000) indicated the following about medication adherence in asthma:

> …Patient or family characteristics including parental and child health beliefs, knowledge of asthma and asthma management skills, cultural issues, and competition of the child's asthma with other basic life needs may contribute to adherence with prescribed therapy for asthma treatment and prevention. (p. 512)

Klok et al. (2015) cite poor adherence to inhaled corticosteroids as a common occurrence in children with asthma (p. 198). Improving adherence to inhaled steroid usage in children with asthma "probably is the most effective method through which healthcare providers can help children with uncontrolled asthma" (p. 197). Three archetypes of non-adherent behavior have been classified, the most basic form of which "is caused by misunderstanding of medical advice by parents" (p. 199). Identified as the first type, "unwitting non-adherence," the parents and caregivers that fall into this group have likely "received little or no education on the disease asthma and its treatment" (p. 199).

Comparatively, parents who intentionally do not comply with medication recommendations "express strong resistance against" the administration of daily medication to their child, for reason such as the following: it "does not feel right to pour chemicals into such a little body'" (Klok et al., 2015, p. 200). These parents, who practice "intentional non-adherence," not only express verbal "resistance to giving daily medication" to their children, but also do not administer inhaled medications as

prescribed (p. 200). “Intentional noncompliance,” as the second type, is rooted in the perception of the severity of disease—as “a person who views asthma as an episodic disease will not perceive the need to take daily preventer therapy” (p. 200). On the other hand, “a person who perceives asthma to be a chronic condition characterized by inflamed airways is more likely to perceive the need for daily controller treatment” (p. 200).

The third type of nonadherence, identified as “unplanned non-adherence” is characterized by “complex family and social or childraising issues, and excessive responsibility given by parents to children at a relatively young age to self-manage the daily use of their own medication without parental supervision” (Klok et al., 2015, p. 200). Other risk factors include “financial problems such as poverty” and access to care such as “lack of healthcare insurance covering daily controller therapy” (p. 200).

Klok et al. (2015) acknowledged that “managing medication is part” of a broader picture, supporting the idea that family adherence to asthma management cannot be assessed by medication adherence alone (p. 201). Along with “the development of a strong and supportive partnership between healthcare providers and patients and their parents” comes the likelihood that asthma caregivers will “accept suggestions to help them overcome the barriers of each of the three types on nonadherence” (p. 202).

Swartz and Meadows-Oliver (2019) reaffirmed that “nonadherence among children to recommendations and medication use is a complex process” (p. e119). Healthful behaviors are based upon “illness perceptions, family beliefs and routines, and social determinants of health such as poverty and access to resources” and directly affect health outcomes (p. e119). To increase adherence, interventions that take place in the

home are recommended, because the home is “where most asthma management takes place” (p. e120). The home setting “provides an excellent opportunity to expand patient education beyond the health care provider’s office” (p. e120). Further, home-based interventions allow health educators “to see what triggers are present in the home and what environmental modifications are needed” (p. e120). Due to the complexity of asthma care and the variability of care required case to case, home visits offer the opportunity to tailor “asthma-related services to the individual client’s needs” (p. e120).

There are also forms of medication non-adherence that involve engagement in risky behavior. This involves the mis-use of inhalants—whether via sharing inhalers with peers (Boyd et al., 2004) or via adolescents exceeding the dose during risky mis-use (Marlatt & Donovan, 2005).

For example, according to Boyd et al. (2004), “using prescription asthma inhalers for nonmedicinal purposes is a potentially risky health behavior” that may decrease adherence (p. 533). Children with asthma, especially girls “between the ages of 9 and 18 years, are willing to share” their inhaled medications with friends (p. 533). Children who have been diagnosed with asthma and have been prescribed inhaled medicine may “share their asthma inhalers when another friend has forgotten a prescribed one” (p. 533). Children who have not been diagnosed with asthma nor prescribed an inhaled medicine and who are “experiencing shortness of breath may simply ‘borrow’ their friends’ inhalers,” self-medicating (p. 533). Albuterol is the “leading medication dispensed for asthma,” primarily administered by an inhaler, which in addition to the bronchodilator includes fluorocarbon propellants and preservatives (p. 533). This form of misuse and

nonadherence, the sharing of inhalers, may be linked to the euphoric "effect of the fluorocarbon propellants," which includes intoxication and mild stimulation (p. 531).

In terms of the magnitude of potential risks some adolescents may seek out, there is the work of Marlatt and Donovan (2005) which identified "Sudden Sniffing Death" as a complication of the misuse of inhalants that "can occur in novice as well as chronic users" (p. 223). Death can occur by "asphyxiation or suffocation" (p. 223). Death and injury may also occur because of the flammability of chemicals in inhalers, and can cause "burns or other injuries if these substances ignite" (p. 223). The "use of old substances in new ways" will continue and serve as a source medical nonadherence as "substances are used outside of the realm or dose of what they were intended for." Because "inhalant use in adolescence may incase the risk for use of other substances in young adulthood," it is imperative that adolescents misusing inhaled medications have treatment options (p. 224). Although currently "few treatments options exist solely for inhalant abuse," guidelines identify key elements necessary in the development of treatment options (p. 228). Treatment options "must take into consideration the level of cognitive impairment of individuals seeking treatments" (p. 228). Treatment options must allow follow-up sessions, as they may be "necessary to address ongoing issues with familial and peer relations that may precipitate relapse" (p. 228).

Potential Barriers to Achieving Asthma Control

According to Champion and Skinner (2008), perceived barriers to health-related behavior change may involve a "nonconscious, cost-benefit analysis" during which time "individuals weigh the action's expected benefits with perceived barriers" (p. 47). Across

health behavior model studies, “perceived barriers were the most powerful single predictor” of change (p. 50).

In asking parents about barriers to their children’s dental care, some 40% of parents indicated they would see a dental provider more often if it were not financially challenging (Hosam, 2020). Some of the other reported barriers were, as follows: 40% of parents reported a lack of time or demands on their time as a barrier (44.0%, n = 33); 32% of parents reported a lack of finances; 32% reported not knowing how often to take their child to the dentist; 29% reported stress in their lives; 28% reported not knowing where to take their child for dental care; 29% reported issues with their work schedule; and, 21% reported a lack of insurance. These findings indicated the potential wide-ranging nature of the barriers and practical realities with which parents of children cope with regard to obtaining healthcare for their child (Hosam, 2020).

Importance of Parents and Increasing Parental Knowledge

According to Greenlee et al. (2019), children with asthma “are at increased risk for myriad challenges including mental health concerns and impaired quality of life” (p. 270). The importance of the parent-child dyad in asthma management cannot be emphasized enough, as “understanding family based factors associated with” the potential “negative outcomes for children with asthma is critical” within the process of developing and implementing “effective prevention and intervention efforts” (p. 270). Studies have shown “links between emotional dysregulation and compromised airway function” and “preventing these problems in children is critical for optimal asthma outcomes” (p. 276).

Paymon et al. (2018) also emphasized the importance of family support and education regarding the control, management, and treatment of their children with asthma (p. 17). Parents may feel unable to help their child during asthma exacerbation, but "care is improved when caregivers are adequately educated on asthma control, management, treatment, triggers, lung function, and the need for follow-up appointments" (p. 18). This is important regarding the overall perception of the burden of disease because "a caregiver who reports control of the child's asthma tends to have a positive perception of disease management" (p. 18).

Horner and Brown (2017) found that "the family's work to manage children's asthma is complicated by the variable nature of asthma symptom onset" (p. 85). Asthma knowledge has "positive influence on self-efficacy for both children and their parents" (p. 95). As parents' "knowledge of asthma improves, it can be better communicated to their child as a means of fostering the child's knowledge and self-confidence to manage asthma" (p. 96). Interestingly, data suggested that "dyads are not co-managing but rather are working independently to achieve asthma control" (p. 96). It is for this reason that parents must take on a "direct role in talking with their children about how to monitor and manage asthma symptoms" (p. 96). Heath educators, along with clinicians and researchers, must make efforts to improve "parents' and children's knowledge of asthma and asthma self-efficacy to thereby improve their asthma management" (p. 97). There is a need to improve "parent-child communication to increase their congruence in assessing asthma symptoms and activity limitations" (p. 97).

Moesley and Hudson (2009) indicated that "minority parents give lower ratings than white parents to their relationship with their child's physician" (p. 407). Further,

minority parents may experience compounding difficulties, such as “difficulty in obtaining medications,” “being less likely to believe that their child needs a daily medication,” and being “distrustful of physicians and the health care system” (p. 410). “Parents’ adherence to their child’s asthma treatment plan is affected by the parent’s perception of the safety of prescribed medications and their assessment of the severity of the child’s asthma” (p. 407). Children suffering from asthma “whose parents do not adhere to the child’s asthma management plan are more likely to have exacerbations” (p. 408).

Coutinho et al. (2016) stated plainly that “caregivers play a significant role in effective child-asthma management” with responsibilities such as “attention to symptoms, understanding of medications and their administration, avoidance of asthma triggers, and effective communication with healthcare providers” being essential to effective asthma care management (p. 230). African American families are “less likely to administer preventive care, use a consistent health-care provider, and are more likely to use” the emergency department for their child’s asthma care (p. 230). These families are “at a greater disadvantage for effectively managing their children's symptoms and navigating the health-care system” due to minority stress factors, including “health-care access, inconsistent use of providers, lack of insurance;” and, they, therefore, “experience mistrust toward the health-care system” (p. 230).

Coutinho et al. (2016) suggested that the empowerment of asthma parents through “increased knowledge of asthma and administration of specific components of asthma management” would improve health outcomes (p. 230). Empowerment of parents “involves caregivers' health-care system knowledge, appropriate disease management and

advocacy skills with the goal of supporting children's effective asthma treatment" (p. 230). Positive health outcomes are observed with caregiver empowerment, such as the finding of "a smaller proportion of days in which children exhibited asthma symptoms" (p. 236).

Researchers have found that both an increase in asthma knowledge and self-efficacy were associated with exposure to a multimedia training on asthma (Zarei et al., 2020). It is, therefore, appropriate to investigate not only asthma knowledge, but also asthma self-efficacy, as did Zarei et al.

Supportive Theories

As with the above cited research of Zarei et al. (2020), there is a justification for research in the field of asthma being rooted in self-efficacy theory. Indeed, this is one among other theories providing justification for the present study, as follows: self-efficacy from social-cognitive theory (Bandura, 1977); and the diffusion of innovations theory (Rogers, 1995).

Statement of the Problem

The problem that this study addresses is the "increasingly felt" need for "educational media" and "innovative methods to improve asthma care" (Zarei et al., 2020, p. 1135). Among the reasons for innovating educational media, there are the potential outcomes of users "developing effective communication," and "providing motivation for learning," while users may potentially form "faster, deeper, and more stable learning"(pp. 1135-1136). Moreover, research has shown that exposing children

with asthma to educational media led to increases in their asthma knowledge and asthma self-efficacy (Zarei et al, 2020).

Purpose of the Study

The present study seeks to address the problem of an increasingly felt need by health professionals for innovative educational media to improve the management of asthma in children by:

(1) having created new educational media in the form of a **new brief e-health online knowledge test intervention (i.e., The Asthma Knowledge Test, or TAKT-40)** —with all true answers;

(2) **evaluating the new brief e-health online knowledge test intervention** (i.e., **The Asthma Knowledge Test, or TAKT-40)** via an online investigation with a convenience sample of mothers (N=62) of children (ages 6 to 14) diagnosed with asthma; and,

(3) identifying the significant predictors of the investigation's **two outcome variables** of
(a) mothers' **asthma knowledge** (as measured by the new TAKT-40, as a true-false knowledge test with all true answers) and
(b) mother's **asthma self-efficacy to manage childhood asthma** at post-test-taking the TAKT-40

Evaluating a New Brief E-Health Online Knowledge Test Intervention

First, the purpose of the present investigation was to **design and evaluate innovative educational media for parents of children with asthma.** The design phase involved a review of research, as summarized in this chapter, and the creation of items for the knowledge test that are based on the review of research. The resultant knowledge test created for this study is called ***The Asthma Knowledge Test for Parents (TAKT-40)***—as a new brief e-health online knowledge test intervention (see Chapter III,

Methods for details). The present investigation's data collection and data analysis is largely focused on the evaluation phase of ***The Asthma Knowledge Test for Parents (TAKT-40),*** as innovative educational media designed for parents of a child diagnosed with asthma.

Of note, what distinguishes this category of a "brief e-health online knowledge test intervention" is the creation of an online True-False test with *all "true" answers* to questions arising from the published research, yet conveyed in easy to understand terms; and, *those taking the test are told "all answers were true" immediately upon completion*, as a vital methodological feature of this e-health. They are then asked to rate their asthma knowledge and asthma self-efficacy for pre-test taking and for post-test taking.

This investigation's use of a new brief e-health online knowledge test intervention follows the work of Aiyedun (2014) and Afram (2019). It was the work of Aiyedun (2014) that allowed the Research Group on Disparities in Health (RGDH, Director, Barbara Wallace, PhD) to begin to use the brief e-health online knowledge test intervention, as a culturally appropriate tool deemed of value to address health disparities in contemporary times. Aiyedun (2014) first combined exposing participants to both an e-health avatar/cartoon video on the HIV window period and a True-False test with all "true" answers; the combination of two forms of e-health (video and knowledge test) may have contributed to the finding of significant changes from pre-test taking to post-test taking test in self-efficacy and stages of change for performing HIV/AIDS risk reduction behaviors.

The research of Afram (2019) permitted the advance of solely administering (without an avatar/cartoon video) a new brief e-health online knowledge test

intervention—covering everything Black men were perceived as needing to know about prostate cancer and Vitamin D supplementation. This study will also follow Afram in designing and evaluating a knowledge test solely, without use of a video, as a brief e-health online intervention.

Of note, this study will also follow Afram's (2019) methodology, since participants are not only told after completing taking the knowledge test that all the answers were true; but also asked to indicate if they would recommend taking the test to others. This serves as a measure of diffusion of the innovation of taking the e-health online knowledge test. They then rate their asthma knowledge and asthma self-efficacy for performing key behaviors—providing ratings at that time for the periods both *before taking the test (pre-test taking)* and *after taking the test (post-test taking)*. Specifically, Afram (2019) found with a global sample of Black men that there were significant increases from pre-test taking to post-test-taking for (a) knowledge of prostate cancer and screening, (b) self-efficacy for talking to doctor about prostate cancer and screening, (c) knowledge of Vitamin D screening and supplementation, and (d) self-efficacy for talking about Vitamin D screening and supplementation with their doctor (Afram, 2019).

In the present study, in contrast, a sample of mothers (N=62) of children ages 6 to 14 rate their pre-test taking and post-test taking asthma knowledge.

Thus, the present study will further build upon the work of Aiyedun (2014) and Afram (2019) in seeking to establish the potential value of new brief e-health online knowledge test interventions with "all true answers."

What is vital to this genre of e-health—i.e. **brief e-health online knowledge test interventions**—is the use of a review of literature to identify vital knowledge, and the

simplification of this knowledge into terms and language comprehensible for those with varied levels of education and literacy in English. This follows the recommendation of Kothalawala et al (2020) that "experimental designs using parental-reported data" should be deemed effective—in particular, when the materials presented to parents have had all clinical jargon deconstructed, making it comprehensible (p. 625).

In sum, a line of prior research provides a rationale for this study seeking to evaluate ***The Asthma Knowledge Test for Parents (TAKT)*** as a new brief e-health online knowledge test intervention—for whether or not it significantly increases mothers' self-reported level of asthma knowledge from pre-test taking to post-test taking.

Toward Predictors of Asthma Knowledge and Asthma Self-Efficacy

Secondly, the purpose of the present investigation is to **identify the significant predictors of each of the following two study outcome/dependent variables**:

(1) mothers having a high level of **asthma knowledge** (as measured by a new true-false knowledge test with all true answers); and, (2) mothers having a high level of **asthma self-efficacy for performing 3 key behaviors for achieving asthma control** (for post-test-taking)**:** i.e., 1- taking care of my child with asthma, and helping my child achieve *asthma control*; 2- talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma.

The selection of these three key behaviors follows the review of literature presented herein. Also, the value of investigating both knowledge and self-efficacy was presented earlier.

The significant predictors of mothers' *asthma knowledge* (as measured by a new true-false knowledge test with all true answers) and *asthma self-efficacy* (for post-test-taking) will be investigated from among the following independent variables:

- *Demographics* (mother's age, race, partner [yes/no], student [yes/no], employment [yes/no], annual household income, highest level of education, number of children)
- Information *about their child with asthma* (age, grade, type of school [urban, suburban, rural, number of years since child's asthma diagnosis, tested for allergies [yes/no], ever prescribed medication [yes/no], currently taking medication [yes/no])
- Degree of *medication adherence* in primary home with mother, and in any secondary home (e.g., father, joint custody, prior partner, grandparents, aunts/uncles, etc.)
- Degree of *asthma impact* (e.g., frequency of child missing school, parents missing work, and parents'/family's experience of a great deal of stress and anxiety
- Extent of *barriers reported* (0 to 12) to getting their child with asthma to see a healthcare provider or pediatrician (or other specialists) as often as they would like or recommended
- *Parental history of asthma* (biological father [yes/no], biological mother [yes/no]), and whether or not the *mother currently takes medication to self-manage asthma* [yes/no]
- Extent of *social desirability* (0 to 10) as the risk of providing socially desirable responses to survey questions
- Extent of *exposure to potential triggers for asthma within the primary home* (16 items, 2 screening questions on whether child lives with mother, if mother has partner who lives there or frequently visits)
- Extent of *exposure to environmental triggers for asthma within the secondary home* (16 items, 2 screening questions on whether child lives/sleeps elsewhere "some of the time" [at least 4 days each month—e.g., father, joint custody, mother's other former partner, a grandmother/grandfather, aunt/uncle, etc.)
- Level of *asthma knowledge* (i.e. *The Asthma Knowledge Test for Parents*)
- If mothers *would or would not diffuse the innovation* of taking the new knowledge test by recommending the test to other parents of children with asthma
- Pre-test taking and post-test taking ratings for mothers' *asthma knowledge*
- Pre-test taking and post-test taking ratings for mothers' *asthma self-efficacy* for three key behaviors [i.e., 1- taking care of my child with asthma, and helping my child achieve *asthma control*; 2- talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]

Research Questions, Survey Parts, and Data Analysis Plan

Given a sample of mothers (N=62) of children age 6 to 14 who have been diagnosed with asthma and respond to a social media campaign using a core message on various online platforms (i.e., "**CLICK ON: https://tinyurl.com/Asthma-Survey-for-Mothers - And take the Survey for Mothers of a Child Age 6-14 with Asthma (Takes 15-20 Minutes) for a chance to win one of three $100 Amazon gift cards."**), this study will seek answers to the following research questions:

Quantitative Portion of the Study

1-What were the mother's *demographics* (mother's age, race, partner [yes/no], student [yes/no], employment [yes/no], annual household income, highest level of education, number of children)?

Part Ⅰ: Parents' Basic Demographics (P-BD-8)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

2-What information did they provide *about their child with asthma* (age, grade, type of school [urban, suburban, rural, number of years since child's asthma diagnosis, tested for allergies [yes/no], ever prescribed medication [yes/no], currently taking medication [yes/no])? What was the degree of *medication adherence* in the primary home with mother, and in any secondary home (e.g., father, joint custody, prior partner, grandparents, aunts/uncles, etc.)? What was the degree of *asthma impact* (e.g. frequency from child missing school, parents missing work, and from any parental/family experience of a great deal of stress and anxiety?

Part Ⅱ: About Their Child with Asthma (ATCWA-13)

- **Medication Adherence Scale** (2 questions)
- **Asthma Impact Scale** (3 questions)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

3-To what extent did they report *barriers* (0 to 12) to getting their child with asthma to see a healthcare provider or pediatrician (or other specialists) as often as they would like or recommended?

Part Ⅲ: Barriers to Child's Health Care (C-OB-CHC-12)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

4-Was there any *parental history of asthma* (biological father [yes/no], biological mother [yes/no]), and does the *mother currently take medication to self-manage asthma* [yes/no]?

Part Ⅳ: Parental History of Asthma and Any Current Self-management of Asthma with Medication by Mother (PHA-ACSMA-WMBM-4)
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

5-To what extent did they present *social desirability* (0 to 10), or were at risk of providing socially desirable responses to survey questions?

Part V: Single Item Rating of Risk of Providing Socially Desirable Responses (SIR-RPSDR-1)
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages (The regression analysis controls for this variable)

6-To what extent was there *exposure to environmental triggers for asthma within the primary home?*

Part Ⅵ: Exposure to Environmental Asthma Triggers in Primary Home (ETEAT-IPH-16+2) [and 2 screening questions]
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

7-To what extent was there *exposure to environmental triggers for asthma within any secondary home*, or where their child lives "some of the time" (i.e., at least 4 days each month—e.g., father, joint custody, mother's other former partner, a grandmother/ grandfather, aunt/uncle, etc.)?

Part Ⅶ: Exposure to Environmental Asthma Triggers in Secondary Home (ETEAT-ISH-16+2) [and 2 screening questions]
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

8-What was their level of *asthma knowledge* (i.e., *The Asthma Knowledge Test for Parents*)?

Part Ⅷ: Asthma Knowledge Test for Parents (TAKT-40)
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages
Note: The TAKT-40 is one of two study outcome variables

9-Did they indicate whether they *would or would not diffuse the innovation* of taking the new knowledge test by recommending the test to other parents of children with asthma?

Part Ⅸ: Diffusion of the Innovation of the Asthma Knowledge Test for Parents (DOI-AKTFP-1)
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

10-When comparing their *pre-test taking versus their post-test taking ratings of their asthma knowledge* was there a significant difference? And, was there a significant

difference when comparing their *pre-test taking versus their post-test taking ratings of their asthma self-efficacy* for three key behaviors [i.e., 1- taking care of my child with asthma, and helping my child achieve *asthma control*; 2- talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]?

Part X: Pre- and Post-Knowledge Test – Ratings for Knowledge and Self-efficacy to Manage Child's Asthma (PRE-A-POST-KT-RF-K-SE-TMCA-8)

- **Scale 1-Asthma Knowledge** (2 questions)
- **Scale 2-Asthma Self-efficacy** (6 questions on 3 key behaviors)
  Note: The Scale 2-Asthma Self-efficacy is the second of the two study outcome variables

Data Analysis Plan: Paired t-tests

11-Were there any significant relationships between selected independent variables and each of **the study outcome/dependent variables of (1) a high asthma knowledge (on the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors** [i.e., **1-** taking care of my child with asthma, and helping my child achieve *asthma control*; **2-** talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, **3-** talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]?

Data Analysis Plan: Independent t-tests, Pearson Correlations, and Backward Stepwise Regression Analysis

12- What were the significant predictors of **the study outcome/dependent variables of (1) a high asthma knowledge (on the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors** [i.e., **1-** taking care of my child with asthma, and helping my child achieve *asthma control*; **2-** talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, **3-** talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]?

Data Analysis Plan: Backward Stepwise Regression Analysis

Qualitative Portion of Study

113-What were the emergent themes from an analysis of qualitative data in response to open-ended questions—regarding: (1) the most difficult and stressful parts of caring for their child with asthma and helping them achieve asthma control; and (2) their best coping strategies, or most successful strategies, or best ways for helping their child achieve *asthma control*, and anything they discovered and can share so other mothers/families can better help their child achieve *asthma control*?

Part XI: Open Ended Questions on Asthma-Related Stress and Coping Strategies (OEQ-OARS-ACS-2)

Data Analysis Plan: Qualitative data analysis for emergent themes

Treatment of the Data

Data will be collected via an online survey created using/hosted by Qualtrics. Upon the completion of data collection, the data will be transferred to the latest available version of SPSS. Data will be displayed in Tables in Chapter IV of the final dissertation, while also discussed in the text.

Anticipated Findings

Data will be collected via an online survey created using/hosted by Qualtrics. Upon the completion of data collection, the data will be transferred to the latest available version of SPSS. Data will be displayed in Tables in Chapter IV of the final dissertation, while also discussed in the text.

Evaluating the Asthma Knowledge Test for Parents (TAKT-40)

It is anticipated that there will be **a significant difference between before/pre-test taking TAKT-40 versus after/post-test taking TAKT-40 mean scores (using paired t-tests)** for self-ratings of their **asthma knowledge**. Here, they rated what they knew about asthma, about taking care of my child with asthma, and seeking the goal of achieving *asthma control*—for both before (pre-test taking) and after (post-test taking) they took *The Asthma Knowledge Test for Parents (TAKT-40).*

Secondly, it is anticipated that there will be **a significant difference between before/pre-test taking TAKT-40 versus after/post-test taking TAKT-40 mean scores (using paired t-tests)** for self-ratings of their **asthma self-efficacy (as a Global Mean) based on performing three key behaviors** (i.e., 1- taking care of my child with asthma, and helping my child achieve *asthma control*; 2- talking to my child about how to

monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma).

Predicting a High Level of Asthma Knowledge – Outcome Variable #1

When seeking to identify the significant predictors of the outcome variable of (1) mothers having a high level of **asthma knowledge (on the TAKT-40)**, and (2) mothers having a high level of **asthma self-efficacy (as a Global Mean) based on performing the three key asthma management behaviors** (listed above), the following is anticipated:

When controlling for social desirability, the higher the mothers' level of **asthma knowledge**, as measured by ***The Asthma Knowledge Test for Parents (TAKT-40),*** then the:

- higher their age
- higher their level of education
- higher their annual household income
- child has had asthma for more years
- medication adherence occurs *all the time* at primary home
- medication adherence occurs *all the time* at any secondary home
- greater asthma impact for child *missing school* occurs *rarely/never*
- greater asthma impact for parent *missing work* occurs *rarely/never*
- greater asthma impact *for parent/family experiencing a great deal of stress and anxiety* occurs rarely/never
- lower the barriers to getting child healthcare, as recommended
- history of asthma in biological mother and/or father (Yes)
- mother is currently taking medication to manage her own asthma (Yes)
- mother does not smoke in primary home
- mother's partner does not smoke in primary home
- lower the number of cats and dogs also living inside the home
- adult responsible for child in any secondary home does not smoke
- partner of the adult responsible for child in any secondary home does not smoke
- the lower the exposure to potential triggers for asthma in the primary home

- the lower the exposure to potential triggers for asthma in any secondary home
- the higher their asthma self-efficacy (Global score)

Predicting a High Level of Asthma Self-Efficacy – Outcome Variable #2

The higher the mother's level of **asthma self-efficacy (as a Global Mean) based on performing three key behaviors,** then the:

- higher their age
- higher their level of education
- higher their annual household income
- child has had asthma for more years
- medication adherence occurs *all the time* at primary home
- medication adherence occurs *all the time* at any secondary home
- greater asthma impact for child *missing school* occurs *rarely/never*
- greater asthma impact for parent *missing work* occurs *rarely/never*
- greater asthma impact *for parent/family experiencing a great deal of stress and anxiety* occurs rarely/never
- lower the barriers to getting child healthcare, as recommended
- history of asthma in biological mother and/or father (Yes)
- mother is currently taking medication to manage her own asthma (Yes)
- mother does not smoke in primary home
- mother's partner does not smoke in primary home
- lower the number of cats and dogs also living inside the home
- adult responsible for child in any secondary home does not smoke
- partner of the adult responsible for child in any secondary home does not smoke
- the lower the exposure to potential triggers for asthma in the primary home
- the lower the exposure to potential triggers for asthma in any secondary home

Delimitations

The study is delimited to mothers (age 21 and above) who report having a child between the ages of 6 to 14 that has been diagnosed with asthma. Some women will also answer questions for where their child lives "some of the time," in the event their child spends 4-8 days out of 30 with another responsible adult (e.g., father, joint custody, other prior partner of mother, grandparents, aunts/uncles, etc.). Hence, there are questions

about both a primary home and secondary home—and the risk of exposure to triggers for asthma in each setting. Other women who do not have to answer questions about any secondary home will take less time to complete the survey.

Limitations of the Study

The study limitations include the ramifications of this being an online investigation administered during a global Covid-19 pandemic with the United States leading the globe in cases. Covid-19-related stress may be a factor contributing to parents feeling too overwhelmed to participate in the study. Or, any mothers of children with asthma experiencing economic Covid-19-related stress may be especially motivated to win the study prize/incentive of a chance to win one of three $100 Amazon gift cards. However, another study limitation involves the potential impact of the digital divide, or disparities in access to the technology (computer, tablet, smart phone, etc.) and Internet connection required to participate in this study. Mothers without such access will not be represented in the sample. Further, the study uses a sample of mothers of convenience, potentially limiting the generalizability of findings.

Conclusion

This chapter introduced the topic of asthma management and control. It also served to provide an overview of the purpose and rationale of this study.

The following chapters will explore the following areas: Chapter II will provide a review of the literature relevant to this dissertation and study. Chapter III will contain the methodology utilized in this study. Chapter IV will comprise the results of data analysis.

And finally Chapter V, will provide a discussion of the study results, including implications and recommendations for future research.

Chapter II

REVIEW OF THE LITERATURE

A review of the literature supporting this study is presented in this chapter. This literature review will cover the following topics**:** 1-childhood asthma, morbidity, mortality, health disparities, and factors related to asthma; 2-asthma treatment and management—factors impacting asthma control and adherence; 3-sample model interventions to improve asthma management; and, 4-theories guiding the asthma research.

I. Childhood Asthma, Morbidity, Mortality, Health Disparities, and Factors Related to Asthma

Hammelman et al. (2019) referred to the Epidemiology and Natural History of Asthma: Outcomes and Treatment Regimens (TENOR), as a 3-year observational study. Findings were noteworthy, arising from a study that followed a sample of children with asthma 6-11 years of age (n=637). The study identified “a significantly higher risk for children with African American background” and “found an imbalance in the risk between different ethnic and social groups” (p. 237). The TENOR study also found a relationship “between the risks of future severe asthma attacks and the occurrence of recent asthma attacks” (p. 237).

By way of important background, Hammelmann et al. (2019) recognized that the word ‘asthma’ is used in many different ways. As a result, “diagnostic imprecision has led all too frequently to therapeutic confusion” (p. 235). Emphasized was the importance of achieving asthma control. Because asthma has been defined as “a clinical syndrome

consisting of wheeze, breathlessness, chest tightness, and sometimes cough" a child being diagnosed signals "the start, not the end, of the diagnostic journey" (p. 235). Hammelmann et al. defined an asthma attack as occurring when "an increase in a patient's asthma symptoms with increasingly impaired lung function requires increased medication and an unscheduled visit to a physician or hospitalization" (p. 237). This definition also "encompasses loss of asthma control" (p. 237). Loss of asthma control and asthma attacks "are linked with high morbidity, significant mortality, and high treatment costs: in the United States, around 10% of all children with asthma experience on asthma-related hospitalization," as well as having at least on emergency room visit (p. 237). Hammelmann et al. noted that asthma attacks are often, though not necessarily, preceded by decreased asthma control, but "frequently occur out of a seemingly stable situation" (p. 238). Further, "frequent and/or recurrent asthma attacks are closely associated with a decline in lung function and, in childhood, are linked to the development of persistent asthma" (p. 237).

Szefler (2018) emphasized how, since the introduction of asthma guidelines, the incidence of asthma hospitalizations and "urgent care visits have been reduced minimally" (p. 773). Further, there are significant "disparities in morbidity across populations caused by social determinants of health" which are inclusive of housing and income factors (p. 773).

For example, the 2011-2012 National Survey of Children's Health in the United States found that the prevalence of childhood asthma was much higher among African American children (22.9%) in comparison to White children (13.1%) (Alwan, 2021).

Woodley (2019) noted how “asthma disproportionately affects minorities, especially Black non-Hispanic children” (p. 192).

Potential Environmental Factors

Attention must be placed on environmental factors in order to achieve asthma control and adequate asthma management. According to Akar-Ghibril and Phipatanaul (2020), children in the inner-city experience “high exposure to certain indoor allergens such as mice and cockroaches as well as ETS (environmental tobacco smoke)”—such that “asthma disproportionately affects inner city children” (p. 1). Such environmental factors may play a considerable role in “increased asthma morbidity” (p. 1). Akar-Ghibril and Phipatanaul noted how “the prevalence of indoor triggers in the indoor environment differs depending on multiple factors, such as location, socioeconomic status, and housing type” (p. 1).

Akar-Ghibril and Phipatankul (2020) discussed how “there is often more than one trigger impacting the child’s asthma symptoms and control” (p. 12). They identified schools and day care facilities as “significant sites of allergen exposure for children with asthma” (p. 6). The School Inner-City Asthma Study (SICAS) showed that inner city schools in the northeastern USA had significantly higher settled dust levels of mouse, cat, and dog allergens compared with homes” (p. 6). A school setting “can also be a source of mold exposure” and secondary indoor pollutants such as the following: “ozone, which form when primary pollutants react in the atmosphere; motor vehicles; calcium-rich particles from wear-out of cement and dry-wall or chalk; biomass burning; soil dust; and marine aerosols” (p. 12). Akar-Ghibril and Phipatankul concluded that attention is needed to the “school environment” as there may be multiple risk factors in that setting (p. 12).

Mansour et al. (2000) also acknowledged the potential role of environmental factors that may negatively impact the goal of achieving asthma control. They included environmental factors "such as geographic location, transportation, and increased exposure to certain allergens" which "may also function as barriers to good health outcomes" (p. 512). Also cited was a parents' inability "to limit exposure to environmental triggers" which might be "related to financial constraints or affordable housing" (p. 512). Mansour et al. discussed how families "from impoverished backgrounds may be less likely to have family or community support for the asthma management of their children"—while being unable to escape the influence of environmental factors (p. 512).

Psychiatric Symptoms as Potential Factors

Other potential factors in pediatric asthma have been investigated. Kulikova et al. (2021) noted the relationship between pediatric asthma and anxiety and depression, which can exacerbate asthma symptoms, while further diminishing the quality of life. Using a sample (N=205) diagnosed with severe persistent asthma, findings confirmed the significant relationship between worse asthma outcomes and symptoms of anxiety and depression ($p < .001$). The variable of asthma control played a greater role in asthma outcomes for girls versus boys. The need emerged for providers to engage in screening for childhood emotional disorders such as anxiety and depression, as part of their approach to managing pediatric asthma (Kulikova et al., 2021).

Saragondlu Lakshminarasappa et al. (2021) similarly found evidence that childhood emotional disorders can exacerbate achieving asthma control in children. They used a small sample (n=76) of children with asthma, while investigating socio-

demographic factors potentially associated with the achievement of asthma control. Specifically, they found that within their sample 13.1% had anxiety and 8% had depression, while another 16.5% presented symptoms of both anxiety and depression. Most noteworthy was the finding that the combination of anxiety and depression was associated with a failure to achieve asthma control.

Expanding the focus yet further, Panisch et al. (2021) investigated potential associations between adverse childhood experiences (ACE) and childhood asthma, using data from the 2017-2018 National Survey of Children's Health (N=49,000) with children aged 0-17 years. Of note, within this large sample, regarding prevalence rates, some 42% had an ACE, as per parental reports, while another 11.5% had childhood asthma. They focused on those children with 3 or more ACE events, finding 1.45 higher odds of having a diagnosis for asthma in those with 3 or more ACE events, in comparison to those children with no reported ACE events. Regarding emergent racial disparities, those children categorized as Non-Hispanic Black were more likely to have asthma in comparison to White children (Panisch et al., 2021).

Conducting research in the same vein, Pape et al. (2021) also acknowledged how Adverse Childhood Experiences (ACEs) have been linked to the development of asthma in children. They acknowledged the potential limitation of reliance on parental reported data. Thus, they used data from national registries, while also identifying asthma phenotypes (i.e. nonasthmatic, early-onset transient, early-onset persistent and late-onset asthma). Specifically, they examined data from a large cohort (N=466, 556) in the Danish National Patient and Prescription Registries. Of note, "ACEs early in life were obtained through registry data of death and morbidity, reflecting illness severe enough for the

parents to seek professional help" (p. 6). Findings showed that "3.8% and 3.9% of the girls and boys, respectively, were exposed to at least one ACE during the first 2 years of their life" (p. 4). In addition, they found that each "specific category of ACE was associated with roughly a similar increase in risk of childhood asthma" (p. 6).

Kaas et al. (2021) also acknowledged how a body of literature established the association between childhood asthma and the risk of also presenting anxiety and depression, while expanding their research focus. Kaas et al. selected for investigation links between childhood asthma and attention deficit hyperactivity as well as the presence of autism spectrum disorders—or what they referred to as asthma-ADHD and asthma-ASD, respectively. By way of a meta-analysis, they found that a significant association between childhood asthma and ADHD, but could not substantiate a significant association between childhood asthma and ASD. Their findings built further upon the literature on the need for providers to attend to co-morbidity involving anxiety and depression, so that they need also pay attention to links between childhood asthma and co-morbid ADHD.

Potential Risk Factors for Asthma

Among children at risk, "maternal and paternal asthma are also associated with adverse long-term outcomes" (Hammelmann et al., 2019, p. 235). In children of parents with asthma, research found "significant reductions in lung function, particularly of small airways measures" (p. 235). Recommendations for future research were advanced. For example, studies could be designed utilizing "information that identifies rick factors for an asthma attack" (p. 239). Findings could be used to "prevent asthma exacerbations by implementing a detailed and focused assessment of the child, the asthma plan, and the

current treatment" (p. 239). In the future, "the application of technology could also be used," specifically, in order to refine our ability to "identify patients within a population that are at risk for an exacerbation (e.g., with the application of machine-learning techniques and personal monitoring)" of asthma symptoms. Future research findings could be applied in order to "enhance our ability to predict those at risk for an asthma attack and hopefully prevent that asthma attack" (p. 239).

Lebold et al. (2020) indicated that "parental asthma and atopy are clearly linked to the development of asthma in children" (p. 113). Additionally, "maternal asthma confers more risk than paternal asthma," which suggested that "exposure to maternal factors in utero uniquely impacts fetal development and asthma risk" (p. 113). Highlighted was the importance of in utero exposure, such that "fetal programming can have long-term consequences on airway function" (p. 114). Specifically identified was how "airway hyperreactivity can be detected at birth" and is "associated with increased risk of asthma in adolescence" (p. 114). Further, discussed was how airway hyperactivity is not the only potential asthma risk indicator that in utero exposure may manifest; also of notable concern was how "airway hyperactivity in children exposed to maternal asthma in utero may occur secondary to structural changes in airways" (p. 114).

Lebold et al. (2020) found that "dams with elevated eosinophils and IL-5, markers of type-2 high asthma give birth to offspring with increased sensory nerve density in airway epithelium" (p. 114). In the same study, it was demonstrated that "in utero development of airway nerves and airway hyperreactivity is a uniquely sensitive time period" for the influence of maternal asthma (p. 114). To ultimately achieve asthma control, treatment modalities are needed that "reduce maternal inflammation and improve

disease control during pregnancy" (p. 117). Alternatively, what are needed are strategies that could "focus on reversing lung changes in offspring after birth," as a method that could potentially be effective (p. 117).

II. Asthma Treatment and Management— Factors Impacting Asthma Control and Adherence

Szefler (2018) summarized how "asthma treatment is organized in a step-care fashion to decrease impairment, minimize risk, and provide a decision path to achieve control" (Szefler, 2018, p. 73). The path to achievement of asthma control "begins with as-needed albuterol and continues in steps with increasing doses of inhaled corticosteroids (ICSs) and addition of additional medications" (p. 74). Furthermore, at each stage of severity there are corresponding guidelines that "list a preferred medication choice and alternatives" (p. 74).

Szefler (2018) explained in more detail how asthma control is achieved through pursuit of the 2 domains of impairment and risk. First, impairment "consists of daytime and nighttime symptoms, rescue medication use, and pulmonary function," including "scores on questionnaires to assess these measures over a short-term period" (p. 74). Secondly, another domain of impairment and risk involves how "risk brings attention to the assessment of the potential for exacerbations, adverse effects caused by medications, and disease progression" (p. 74).

Foster et al. (2014) affirmed that "adherence with inhaled controller medications particularly inhaled corticosteroid (ICS)-containing medications is important for achieving good asthma control" (p. 1260). For a child living with asthma, "poor adherence contributes to mortality and morbidity, including uncontrolled symptoms,

impaired quality of life, exacerbations, and urgent health care utilization" (p. 1260). It is interesting to note that "without interruptions in ICS use, asthma-related hospitalizations could be reduced by 60%" (p. 1261). Poor adherence to medications is identified as "1 of the top 3 barriers to the delivery of effective asthma care" (p. 1260).

Indeed, within the literature, great emphasis has been placed upon adherence to medication regimens for achieving the control of asthma symptoms in children. For example, it has been recommended that doctors treating children with asthma "should assess and correct adherence at every visit" (Foster et al., 2014, p. 1260). Yet, the guidelines "provide few practical interventions," and what is provided is "too complex to be feasible for primary care" (p. 1260). Foster et al. noted that barriers to adherence could be "intentional"—as parents might have "doubts or concerns about treatment effectiveness or side effects" (p. 1261). Other barriers to adherence could be "unintentional," such as in parents "forgetting" having "chaotic lifestyles" (p. 1261). It is also possible that the field of asthma treatment is merely lacking by having "no practical interventions" as yet "developed to address" these types of problems plaguing "primary asthma care" (p. 1261).

Foster et al. (2014) also discussed how for "intentional poor adherence" there may be other solutions on the level of the provider—such as "providing health professionals with communication training, for example" (p. 1261). Other providers may need training "in empathic nonconfrontational motivational interviewing techniques" (p. 1261). The use of such techniques might be the key to modifying "patients' beliefs and attitudes, leading to improved health behaviors and medication adherence" (p. 1261). Furthermore, yet other solutions may be needed to effectively address "unintentional poor adherence in

chronic diseases due to forgetting," such as the implementation of "reminder packaging (e.g., blister packaging for tablets)" which might improve adherence "by establishing medication-taking routines" (p. 1261).

Insufficient parental knowledge could also be a factor in poor adherence. Hammelman et al. (2019) suggested that "patients and their families should be made aware by their physicians of potential long-term sequelae of non-optimal asthma control" (p. 235). The consequences of loss of asthma control include "reduced lung function, which is a significant risk factor for adult disease, particularly COPD" (p. 235). Knowledge of such consequences might enhance parental efforts for ensuring adherence.

What appears to be poor adherence could also be related to barriers to adherence and good asthma management. For example, Woodley (2019) noted potential barriers to proper asthma management, including the barrier of low "accessibility of local health care providers" (p. 192). Woodley also cited the role of multiple potential factors: "having too little money, too much exposure to environmental triggers, language barriers, lack of access to health care, and/or low health literacy"—as per The Patient Centered Outcomes Research Institute (PCORI) (p. 192).

Also, focusing on factors related to nonadherence, Klok et al. (2015) identified three archetypes of nonadherent behavior in children with asthma, as follows: the factor of misunderstanding of medical advice on the part of parents; possible intentional non-adherence, or even intentional noncompliance (p. 200). Acknowledged was how nonadherence was viewed as a "complex behavioural process influenced by many interacting factors" (p. 200). Intentional nonadherence may be quite common, while often driven by factors such as illness perceptions and medication beliefs on the part of patients

and parents, who may then “deliberately choose not to follow the doctor's recommendations” (p. 200). Conversely, “common non-intentional barriers are related to family routines, child-raising issues, and to social issues such as poverty” (p. 200) Neither aspect can be downplayed; “effective interventions improving adherence are complex, because they take intentional and non-intentional barriers to adherence into account” (p. 2015).

Improved adherence, or improved management of asthma often follows from educating parents, or increasing their knowledge. A source of motivation for improved management of asthma involves the goal of decreasing school absences related to poor asthma control. For example, according to Agusala et al. (2018), school absences due to asthma “have been shown to have many adverse effects on children including a decrease in academic performance as well as mental and social hindrances” (p. 3173). In their study, it was hypothesized that asthma education “would lead to better parental/caregiver knowledge about common asthma triggers, awareness of preventative measures, and confidence in appropriate medication management for symptom exacerbations, eventually resulting in reduced school absenteeism” (p. 3173). Some 201 pediatric patients were enrolled in the study along with their parents/caregivers and an educational intervention was delivered; change in parental/caregiver knowledge was “obtained via telephone before and after the education intervention was delivered” (p. 3172). They found that “most of the parents/caregivers of asthmatic children reported increased knowledge in managing their children’s asthma symptoms, triggers, and signs” (p. 3179).

Another potential source of motivation for parents seeking improved adherence and improved management of their child’s asthma may involve the goal of avoiding the

negative impacts of nocturnal asthma—which include negative impacts on *both parents and childre*n. For example, Evans et al. (2021) found in a small study (n=33) with adolescents aged 12 to 15 years with poorly controlled asthma that 42% of the adolescents and their parents indicated nocturnal asthma symptoms were worse, while causing frequent sleep disturbance.

More pointedly, as per Fagnano et al. (2011) sleep disturbance "can greatly influence the child's health and well-being" and nocturnal symptoms "may contribute significantly to their disease burden"—*as a burden extends to the whole family* (p. 6). For example, "parents of children with frequent nocturnal symptoms are more likely to miss work which may result in lost wages" (p. 6). Further, parents of children with nocturnal symptoms "have increased daytime fatigue themselves as well a negative mood" (p. 6). Quality of the parents' sleep was assessed by asking parents: "over the past 2 weeks (14 days), how many nights did you wake up or lose sleep because of your child's asthma?" (p. 3). Parents' quality of life was then assessed using Juniper's Pediatric Asthma Caregivers Quality of Life Questionnaire (PACQLQ), which is a 13-item scale that "measures the degree to which the child's asthma interfered with the parent's normal daily activities over the past week" (p. 3). Fagnano et al. found a "significant association between parent depression and nocturnal asthma symptoms" with "a higher prevalence of parent depressive symptoms among children with more significant nighttime symptoms" (p. 4). The burden on parents clearly emerged, as "parents of children with frequent nighttime symptoms reported more nights of lost sleep as well as lower quality of life, even when controlling for depressive symptoms" (p. 6).

Yet, another potential source of motivation for parents seeking improved adherence and improved management of their child's asthma may involve acknowledgment of the negative impacts *upon their children*. Fagnano et al. (2011) "analyzed baseline data from 287 urban children with persistent asthma (ages 4 -10)" enrolled in the trial on School-Based Asthma Therapy (p. 1). Nocturnal asthma symptoms of children were assessed by asking parents, as follows: "over the past 2 weeks (14 days), how many nights did your child have any wheezing, coughing, tightness in the chest or trouble breathing?" (p. 2). Guidelines from the National Heart Lung and Blood Institute (NHLBI) were then utilized to "categorize the level of nocturnal asthma severity for each child" (p. 2). Quality of children's sleep was assessed by employing "the abbreviated version of the Children's Sleep Habits Questionnaire (CSHQ)," which is a "33-item scale comprised of 8 subscales" that yields a "total Sleep Score" ranging from 33 to 99; higher scores indicated "worse quality of sleep" (p. 3). Quality of children's sleep was further assessed by asking parents: "during the past week (7 nights), on how many nights did your child get enough sleep for his/her age?" (p. 3).

Findings showed that of the 287 children in the final data set, "only 41% had intermittent nocturnal symptoms, and the remaining 59% had persistent nocturnal symptoms (23% mild persistent, and 36% moderate to severe persistent)" (Fagnano et al., 2011) p. 4). Fagnano et al. elaborated, as follows:

> In this study, we found a substantial burden of both nighttime asthma symptoms and poor sleep among urban children with significant asthma. Overall, 59% of children had persistent nighttime asthma symptoms, and nearly half (46%) of children had at least one night per week of inadequate sleep. Children's sleep quality, indicated by the total sleep score on the CSHQ and several subscales, decreased as their nocturnal asthma symptoms increased. The likelihood of the child having inadequate sleep, the parent having lost sleep and poorer parental quality of life incrementally increased as the frequency of nocturnal asthma

> symptoms increased. Importantly, we found that the mean total sleep score for children in each asthma severity level was above the clinically significant CSHQ cut-off of 41, indicating pervasive sleep disturbances among this population of children with asthma. (p. 5)

Emphasizing the significance of their findings, Fagnano et al. (2011) highlighted how among "children with asthma, sleep disturbance due to nocturnal symptoms can greatly influence health and wellbeing, and may contribute significantly to their disease burden" (p. 6). Parents may be underreporting their child's sleep disturbances, as well as their own—which could contribute to physicians lacking vital information they need for proper medication prescribing practices. Also discussed was how exposure to "environmental tobacco smoke has been shown to be an important factor influencing both nocturnal asthma symptoms and sleep quality" (p. 6). This suggested the need for further research.

Meanwhile, dimensions of parental adherence and asthma management include the need to avoid exposing children to environmental tobacco smoke. Hence, adequate reporting of nocturnal asthma and sleep disturbances, as well as smoking in the home, all emerge as key to effective asthma management.

III. Sample Model Interventions to Improve Asthma Management

What emerges as urgent, are interventions that may improve asthma control, and improve asthma outcomes. This includes the essential need to improve the management of asthma---whether via interventions in schools with nurses, with practitioners, or with caregivers. A few selected studies are indicative of the types of contemporary interventions being done to improve asthma management.

A Model Nurse-Led School Based Intervention

A study by Isik et al. (2020) investigated the effectiveness of a school-based theoretically informed intervention that was led by school nurses as an "asthma intervention on symptoms" designed to improve asthma management (p. 2). The study was based on a sample of elementary school-age children aged 7 to 12. Participants "were recruited from eight primary schools in a diverse, urban public independent school district in Southwestern United States" (p. 3). Students were English-speaking children and diagnosed with asthma, while excluding those with "other disabilities or comorbid medical conditions" (p. 3). Students were randomly assigned to a treatment group involving a school nurse-led asthma intervention with 6 weekly 30-min group lessons delivered at all eight schools (p. 4).

Results showed that students in the nurse-led intervention had fewer interruptions in their daily activities than the students in the control group post-intervention (Isik et al., 2020). Further, "the analysis demonstrated that children living with asthma, who participated in the nurse-led asthma intervention, reported better quality of life" than children who "received usual asthma care" (p. 7). Ultimately, "this study demonstrated that a school nurse–led asthma intervention was a supportive program that increased awareness of asthma management techniques and self-care abilities.

A Model Practitioner Delivered Intervention to Improve Asthma Management

Foster et al. (2014) focused on practitioners and the use of "inhaler reminders and adherence feedback in primary care" (p. 1267). They deemed these two interventions as potentially serving as "simple, feasible, and highly effective" strategies "for improving the adherence of general practice patients with asthma" (p. 1267). Foster et al.

"conducted a 6-month pragmatic cluster 2x2 factorial parallel-group randomized controlled trial in" general practitioners" (p. 1261). The practitioners were randomized and those in the intervention group were "trained to deliver" the interventions "with patients from their practice" (p. 1261). The interventions included "personalized audiovisual inhaler reminders and feedback (IRF) as well as "brief personalized adherence discussions (PADs)" (p. 1261). General practitioners were also "trained to carry out a personalized discussion about the patient's" key barriers to adherence, while helping patients to "set goals" with a focus on "goal-achievement strategies," as well as a focus on "asthma issues that the patient wished to resolve using patient-centered materials" (p. 1262). Participants were aged 14 to 65 years with suboptimal asthma control (p. 1261). Participants received "a powerful combination of reminder and feedback" which "allowed patients to receive prompts for missed doses as well as to view their detailed mediation-taking patterns" (p. 1267).

Foster et al. (2014) reported findings showed that, after "6 months, mean adherence" in the "reminder/feedback groups was double that" of mean adherence scores "in non-reminder/feedback groups (60% vs 29%)" (p. 1264). Findings indicated that "clinically important improvements were seen in the primary outcome measure" of the asthma control score for those who received the intervention with their general practitioner (p. 1264).

A Model Online Asthma Intervention for Caregivers

Sawicki and White (2020) evaluated "the impact of a novel education format for caregivers" that was a live webinar" designed to improve "asthma control in preschoolers" (p. 77). In their research, "the primary aim of the study was to examine

asthma control over time after participation in live webinar asthma education" (p. 80). While acknowledging how asthma is "a chronic condition with a heavy disease burden," which "requires comprehensive patient and caregiver education," they considered a novel online approach to parent education (p. 82). They considered the many "obstacles associated with access, time, travel, and associated costs to attend in-person asthma education" that "pose significant barriers for some caregivers of children with asthma" (p. 78). Further complicating matters, "time constraints and distractions during office visits may also limit the quantity and quality of asthma education" (p. 78). Outside of an office visit setting, "availability of asthma management programs for parents of preschool children may be limited" (p. 78). It is for these reasons that "cost-efficient, easily accessible alternative options for asthma education may improve the knowledge of caregivers of children with asthma and their ability to manage their child's asthma at home" (p. 78). Also, "a large majority of caregivers with preschool children are likely Millennials"—and these caregivers of children with asthma "may prefer a web-based asthma education class" (p. 78). Often, "millennials find web-based services efficient and prefer to communicate through e-mail, chat, or video" (p. 78). Fortunately for asthma researchers, "this preference for web-based communication can also be used advantageously for patient education" (p. 78).

In deciding upon the design of their intervention, Sawicki and White (2020) discussed how "telehealth is clearly a part of today's health care service and is ever growing" (p. 82). Telehealth is defined as encompassing "health-related services, including patient education, provider consultation and training, and remote care and home monitoring" (p. 82). Sawicki and White also cautioned that "prior to incorporating

web-based programs into practice, it is important to understand Internet accessibilities and demographics of the patient population" to determine whether web-based education interventions are appropriate" (p. 82).

With these considerations in mind, Sawicki and White (2020) invited the caregivers of "preschool children with asthma" to participate in "a single one-hour live asthma education webinar" (p. 77). In total, "30 eligible caregivers enrolled in the study, attended the asthma education webinar, and completed at least one online survey" (p. 80). The variable of asthma control was "measured using the Test for Respiratory and Asthma Control in Kids (TRACK) prior to the webinar"—as well as being measured at "one month, and three months following" the webinar (p. 77). The sample included all those "caregivers who completed all three data collection point surveys" (p. 80). They found upon follow-up that there were "statistically significant increases in TRACK scores" that were indicative of "improved asthma control" for participants in the online webinar (p. 77). The "secondary aim of the study was to evaluate how satisfied the caregivers of these young asthmatic children were with the "live webinar asthma education format" (p. 80). Findings showed that "more than 84% of the respondents (n=25) reported the live asthma webinar was simple to use, convenient, and contained helpful information, and they would recommend the webinar to family and friends" (p. 80).

This study had another secondary aim which included determining "the incidence of emergency room visits and hospitalizations" (Sawicki & White, 2020, p. 81). *Before* attending the asthma education webinar, "participants were asked the number of times their child with asthma had been to an emergency room or hospitalized in the past 6 months (just prior to their webinar attendance)" (p. 81). *After* exposure to the webinar

intervention, Sawicki and White found that "more than 60% of caregivers reported zero emergency room visits, and more than 70% reported zero hospitalizations for their asthmatic children" (p. 81).

IV. Theories Guiding the Asthma Research

There is justification for research in the field of asthma being rooted in two theories, as follows: self-efficacy from social-cognitive theory (Bandura, 1977); and the diffusion of innovations theory (Rogers, 1995). The two theories selected to guide the present asthma research are presented in this section.

Self-Efficacy Theory

Perceived self-efficacy was advanced by Bandura (1977) as playing a central role in behavior change. "An efficacy expectation is the conviction that one can successfully execute the behavior required to produce the outcomes" (p. 193). Interventions may serve "as a means of creating and strengthening expectation of personal efficacy" (p. 193). Bandura elaborated on self-efficacy, below:

> …The strength of people's convictions in their own effectiveness is likely to affect whether they will even try to cope with given situations. At this initial level, perceived self-efficacy influences choice of behavioral settings. People fear and tend to avoid threatening situations they believe exceed their coping skills, whereas they get involved in activities and behave assuredly when they judge themselves capable of handling situations that would otherwise be intimidating.
>
> Not only can perceived self-efficacy have directive influence on choice of activities and settings, but, through expectations of eventual success, it can affect coping efforts once they are initiated…. (pp. 193-194)

Bandura (2004) has also described self-efficacy as beliefs that influence goals and aspirations, which "shape the outcomes people expect their efforts to produce" (p. 145). Specifically, regarding the pediatric management of asthma symptoms, "self-efficacy

beliefs must be measured against gradations of challenges to successful performance" (p. 145). Through interventions utilizing new technology, such as video games, children improve "knowledge about asthma," (p. 156). Increased knowledge in turn leads to enhanced "perceived efficacy to avoid things that trigger asthma attacks" and improved "use of emergency medications" (p. 157). Self-efficacy is a process of personal change, and beliefs of the parents and beliefs of children must both be developed (p. 143).

With the present study seeking to directly impact parental asthma knowledge, while assessing both the impact on self-ratings of knowledge and self-efficacy for important asthma management tasks, the theory of Bandura (1977, 2004) provides an excellent foundation and guide for the study.

Diffusion of Innovations Theory

According to Rogers (2005), when communication strategies that are available across socioeconomic groups, such as internet videos, are utilized, then "the socioeconomic structure may no longer be such a major barrier to the diffusion of innovations for the most disadvantaged segment of the population" (p. 126). This is because the videos can be accessed by traditionally disadvantaged individuals (p. 126). However, "status barriers, geographical location, and other variables affect diffusion patterns" (p. 245).

Several studies (Afram, 2019; Aiyedun, 2014) have utilized the diffusion of innovations theory of Rogers (1995) as a framework when determining whether study mothers intended to diffuse the innovation of watching short online e-health videos to facilitate behavior change in their children—doing so by recommending the e-health videos to other mothers and children. Key to the diffusion of innovation process is the

communication of new ideas from one person to another, while actual social change may follow when such new ideas are invented, and then diffused and adopted—while some ideas will also be rejected (Rogers, 1995).

In the tradition of prior research (i.e., Afram, 2019; Aiyedun, 2014), as a brief online e-health genre, within which the present study may be located, it is appropriate to follow the prior research in also using the theory of Rogers (1995).

Conclusion

This chapter provided a review of the literature, covering the following topics: 1-childhood asthma, morbidity, mortality, and health disparities; 2-asthma treatment and management—factors impacting asthma control and adherence; 3-sample model interventions to improve asthma management; and, 4-theories guiding the asthma research.

The next Chapter III will provide the study methods.

Chapter III

METHODS

This chapter outlines the methodology and procedural steps followed in this study. This chapter will present the study design and procedures, a description of the study participants, and a description of the research instruments. Finally, the chapter will provide details of the treatment of the data and data analysis plan.

Study Design and Procedures

This is a cross-sectional study that employed the use of an online survey. Qualtrics provided the platform and secure technology to support the online survey, as the only platform deemed sufficiently secure for research use by Teachers College, Columbia University. This section offers an overview of all relevant study procedures.

IRB Approval

Before any data collection could begin, this study was granted approval from the Teachers College, Columbia University Institutional Review Board (IRB) as Protocol #21-129 with an "exempt status" (see **Appendix A**, *IRB approval Letter*). It was not until IRB approval was received that the study's data collection began (i.e., January 22, 2021).

Recruitment of Study Participants

This study recruited 62 Mothers of a child diagnosed with asthma aged 6-14. Mothers were recruited to this study via a social media campaign, wherein the primary study recruitment message, shown below, was widely disseminated via Twitter,

LinkedIn, Reddit, Instagram, Facebook, emails (see **Appendix B**, study email), and tweets/text (see **Appendix C**, study tweet/text) messages:

> **CLICK ON: https://tinyurl.com/Asthma-Survey-for-Mothers - And take the Survey for Mothers of a Child Age 6-14 with Asthma (Takes 15-20 Minutes) for a chance to win one of three $100 Amazon gift cards**

Study Inclusion/Exclusion Criteria

The study Screening Tool (See **Appendix D**, screening tool) embodies the study inclusion-exclusion criteria, as also shown below:

> 1-Are you a woman age 21 or older?
> Yes ___ No___
> 2-Are you able to read and understand English on a high school level?
> Yes ___ No___
> 3-Are you the parent or guardian of at least one child aged 6 to 14 diagnosed by a healthcare provider or pediatrician with ASTHMA?
> Yes ___ No___
> 4-Are you willing and able to spend about **15-20** minutes answering survey questions— about yourself, your children, the care of your child's asthma, and what you know about asthma?
> Yes ___ No___

Study Completion and Entering E-mail Address for Chance to Win a Prize

Once participating mothers completed the survey, they were routed to a "thank you" page where they were: (1) thanked for their study participation and; (2) invited to enter their email address, thereby formally entering into a lottery for a 1 in 3 chance to win one of three $100 Amazon gift cards, for use on www.Amazon.com. Participating mothers were made aware that their study information was not linked to their email addresses, thereby ensuring their confidentiality. The email data was encrypted. As a closing step, the webmaster of the Research Group on Disparities in Health (RGDH), Dr. Rupananda Misra, was the creator of and manager of the program for selecting the three winners of the lottery, thereby running the program after informed of closure of the

study (i.e., February 20, 2021). The winners received an email with their bar-coded gift certificate information.

Description of the Study Participants

After a period of four weeks of data collection (i.e., January 22, 2021 to February 20, 2021), 105 mothers had completed the Informed Consent and proceeded to start the survey. However, data analysis could proceed with only 62 mothers who completed the survey to the point of providing data for at least one of this study's two outcome variables. There were another 14 mothers who were eligible for study participation, but did not complete the survey to the point of providing data for a study outcome variable. When comparing the group of survey completers (n=62) to the group of survey non-completers (n=14), using independent t-tests, there were no significant differences between groups for age, income, education, or number of children.

Other Study Procedures

Completing the survey took 15-20 minutes of mothers' time. Potential participating mothers who were interested in the study were able to follow the study invitation, click on the link to the survey, and access the survey. Immediately after clicking on the study link, potential participating mothers read and electronically signed informed consent documents and read their participants rights (see **Appendix E** for the Informed Consent). After giving their consent, mothers completed a short screening questionnaire with the study eligibility (see **Appendix D**, Screening Tool). If mothers were not eligible, they were then routed to a disqualification page that explained that they were ineligible, while encouraging them to share the study link they used to access the

survey with a mother that thought might meet eligibility criteria. Those mother who were eligible for study participation could proceed to the study survey (see **Appendix F**, Study Survey).

Description of Research Instrumentation

The study measure is entitled "Survey for Mothers of a Child Age 6-14 with Asthma" (see **Appendix F**). This survey has multiple parts, as described in this section.

Many of the survey parts are standard tools commonly by the Research Group on Disparities in Health (RGDH), Director, Professor Barbara Wallace, Teachers College, Columbia University. The Research Group on Disparities in Health (RGDH) is part of the Center for Health Equity and Urban Science Education (CHEUSE), Teachers College, Columbia University; and Dr. Barbara Wallace is Co-Director of CHEUSE. Many studies are conducted annually by the RGDH, with Dr. Barbara Wallace serving as the research sponsor, including this doctoral dissertation. Thus, some of the subscales utilized in this study have been used in previous research studies conducted by the RGDH. Some survey parts are new, having been created by the Principal Investigator and the dissertation sponsor, Professor Barbara Wallace, for first-time use in this study.

This section will describe all of the survey parts, or scales and sub-scales, while they appear within the full study survey in **Appendix F**.

Part I: Basic Demographics (P-BD-8)

The P-BD-8 is a standard tool used by the RGDH. Here, this scale has 8 items to capture basic demographics of the sample (e.g., age, race/ethnicity, education level, household income, and employment status). This tool allows for descriptive statistics,

including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part II: About Their Child with Asthma (ATCWA-13)

The ATCWA-13 was developed by the Principal Investigator with her dissertation sponsor, Dr. Barbara Wallace, as a new tool for use by the RGDH. This tool gathers information about the child (i.e. grade in school, type of school, years diagnosed with asthma, medication), as reported by the mother, and also has two scales. First, the **Medication Adherence Scale** (2 questions), asks about frequency of taking medication as prescribed when home and away from home—rated on a 5-point Likert scale as follows with a sample item:

> Please rate HOW OFTEN your child is receiving their asthma medication WHEN THEY ARE AT HOME the way they are supposed to, or the way their healthcare provider or pediatrician wants your child to take it.
>
> *5-All the time 4-Most of the time 3-Sometimes 2-Rarely 1-Never. __I don't know __Not applicable/my child is not taking asthma medication at this time*

Secondly, the **Asthma Impact Scale** (3 questions)—which, with three items will permit arriving at Cronbach's Alpha for internal consistency—captures the impact of the child's asthma on school attendance, parents' missing work, and parents and family experiencing a great deal of stress and anxiety. A sample item with 5-point Likert scoring follows:

> How often have you or a co-parent/caretaker **missed work** due to taking care of your child's asthma—whether for visits to an emergency room, a healthcare provider/ pediatrician, or for staying home with your sick child due to their asthma.
>
> *5-Extremely often 4-Many times 3-Sometimes 2-Rarely 1-Never. __I don't know*

Both of the scales permit providing data for descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part III: Barriers to Child's Health Care (C-OB-CHC-12)

This was a new scale created for use in Alrqiq (2020), and for use by the Research Group on Disparities in Health (RGDH). Questions were modified to address seeing a healthcare provider or pediatrician. This scale has 12 times to capture information about the specific type of barriers to care that mothers perceive—scored Yes=1 and 0=No, as sample items, below, show:

> I have experienced the following barriers or obstacles to getting my child with asthma to see a healthcare provider or pediatrician (or other specialists) as often as I would like or recommended: (check all that apply)
>
> 1-__ stress in my life __*YES (1)* __*NO (0)*
> 2-__ lack of transportation to and from providers __*YES (1)* __*NO (0)*
> 3-__ my work schedule __*YES (1)* __*NO (0)*
> 4-__ lack of sufficient hours for when the clinic is open/provider available
> __YES (1) __NO (0)
> 5-__ lack of continuity in care—or seeing a different provider each time
> __YES (1) __NO (0)
> 6-__ lack of trust in providers and the medical system __YES (1) __NO (0)
> 7-__ lack of insurance __*YES (1)* __*NO (0)*

This tool allows for descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part IV: Parental History of Asthma and Any Current Self-Management of Asthma with Medication by Mother (PHA-ACSMA-WMBM-4)

This is a new scale created for first time use in the study by the Principal Investigator and Dr. Barbara Wallace—and for use by the Research Group on Disparities in Health (RGDH). The scale has 4 items to gather information about paternal atopy of asthma, or any potential genetic predisposition, as well as any current self-management

of asthma by the mother via the use of asthma medication—with the item and scoring options (Yes=1; No=0), as follows:

> 1-To the best of your knowledge, was your CHILD's biological FATHER ever diagnosed with asthma, or had asthma?
> __Yes. __No. __Not sure/Don't know
> 2- Are you the child's biological mother (not adopted)? __Yes. __No.
> 3-Were you ever diagnosed with asthma, or had asthma?
> __Yes. __No. __Not sure. *IF YES✍ answer next question.
> *4-Please check the option that best applies to you:
>
> **1=_I am** CURRENTLY (NOW) taking asthma medication
> **0=_I am not** CURRENTLY (NOW) taking asthma medication (no asthma, or no need to take medication for asthma)
> **0=_I used to** take asthma medication, but no longer do
> **0=_I have never had a need to** take asthma medication in my entire life

This tool provides descriptive statistics, but most importantly, gives rise to: a *dichotomous variable for biological father or mother having asthma (yes/no) for use in subsequent analyses.*

Part V: Single Item Rating of Risk of Providing Socially Desirable Responses

This is a new single item scale created for first time use by Dr. Barbara Wallace in studies in 2018, starting with Laryea (2018)—and for the Research Group on Disparities in Health (RGDH), in general. This tool reduces the burden of time for participants, while providing a variable on level of *risk for providing socially desirable responses, which is controlled for in the regression analysis*. The single item and scoring follow:

> 1-I sometimes say things that I think will please people, or what I think they want to hear—versus the honest truth, which might be difficult or painful for other people to hear and accept, or might lead them to judge me harshly…
>
> I rate myself on a scale of 0 to 10, as follows:
>
> 0 1 2 3 4 5 6 7 8 9 10
> 0-I am not like this at all — 10-I am like this all the time

The scale provides a mean rating with standard deviation and minimum and maximum scores.

Part VI: Exposure to Environmental Asthma Triggers in Primary Home (ETEAT-IPH-16)

Part VII: Exposure to Environmental Asthma Triggers in Secondary Home (ETAT-ISH-16)

These are two new tools created by the Principal Investigator and the dissertation sponsor, Dr. Barbara Wallace, for first time use in this study, and use by the Research Group on Disparities in Health (RGDH). With a focus on **potential exposure to environmental asthma triggers in the primary home and secondary home of the child**—with Part VI and Part VII having the same items. As new tools, being implemented with a small sample (N=62), what became apparent through data cleaning and data analysis were the limitations of having many items endorsed at a low frequency, and the benefits of modifying the planned scoring strategy. As a pilot with a small sample (N=62), what emerged were important refinements in the tools which may benefit future research. Specifically, items endorsed with a low frequency were best turned into dichotomous items where 1=Yes and 0=No for any endorsement at all of the item in question.

The Emergent Dichotomous Scoring Strategy: 8 Items Scored 1=Yes, 0=No

It was possible for participants to achieve **a high score of 8 for environmental asthma trigger items that were combined from Parts VI (primary home) and VII (secondary home).** This represented accumulating **1 point (Yes*)*** for the presence of any **environmental asthma triggers risks** to which the child was being exposed—**based on 7 possible points in the primary home** and **1 possible point in the secondary home**

(i.e. the home of the father, for example, while *secondary home was defined as any other home where the child spent the night for a minimum of 4 days per month*). Because of the very low frequency with which items were endorsed by participants regarding any secondary home (i.e. 17.7%, n=11 had secondary home), **all scores for the secondary home were reduced to just 1 score—for there being any (Yes=1) environmental asthma trigger risks in that setting at all.**

The **resultant 8 categories of dichotomous variables** (Yes=1, No=0) for which a measure of **total environmental asthma triggers for the child,** follow:

PART VI: EXPOSURE TO ENVIRONMENTAL ASTHMA TRIGGERS IN PRIMARY HOME (ETEAT-IPH-16)

- **1-ASTHMA ENVIRONMENTAL RISK FACTOR # 1—ANY SMOKER IN THE HOME:** COMBINED ITEMS # 1, # 2, and # 12 for SINGLE VARIABLE FOR ANY SMOKER IN THE HOUSE, SCORED **1=YES** or 0=NO
- **2-ASTHMA ENVIRONMENTAL RISK FACTOR # 2—LIVES IN URBAN SETTING:** SCORED **1=YES** or 0=NO
- **3-ASTHMA ENVIRONMENTAL RISK FACTOR # 3—LIVES IN OLDER HOUSING STOCK:** SCORED **1=YES** (≥ 25 YEARS OLD) or 0=NO (<25 YEARS OLD)
- **4-ASTHMA ENVIRONMENTAL RISK FACTOR # 4—RISK FROM HOUSING IN POOR CONDITION:** SCORED **1=YES** IF POOR CONDITION, 0=NO
- **5-ASTHMA ENVIRONMENTAL RISK FACTOR # 5—RISK FROM ANY ROACHES, MICE OR OTHER PESTS IN HOME:** SCORED **1=YES** IF PESTS IN HOME, or 0=NO
- **6-ASTHMA ENVIRONMENTAL RISK FACTOR # 6—RISK FROM ANY PET EXPOSURE IN THE HOME:** SCORED **1=YES**, or 0=NO
- **7-ASTHMA ENVIRONMENTAL RISK FACTOR # 7—RISK FROM NEARBY TRUCK ROUTES:** SCORED **1= YES**—SOMEWHAT TO EXTREMELY CLOSE; 0-NO—NOT CLOSE AT ALL

PART VII: EXPOSURE TO ENVIRONMENTAL ASTHMA TRIGGERS IN SECONDARY HOME (ETEAT-ISH-16)

- **8-ASTHMA ENVIRONMENTAL RISK FACTOR # 8: ANY ASTHMA RISK FROM SECONDARY HOME:** SCORED **1=YES** or 0=NO

(NOTE: ALL ANSWERS ON PART VII TURNED INTO A SINGLE DICHOTOMOUS VARIABLE FOR ANY PRESENCE OF ABOVE 7 RISKS=YES

8 (1=YES) = TOTAL POSSIBLE HIGH SCORE BASED ON PARTS VI & VII

The resultant variable for **extent of exposure to environmental asthma triggers (in the primary home and secondary home) for the child**—based on the above 8 risk categories, will produce a mean score, standard deviation, and minimum and maximum scores. This variable for **extent of exposure to environmental asthma triggers for the child is a continuous variable** for use in subsequent analyses (e.g., correlations, regression).

Part VIII: The Asthma Knowledge Test for Parents (TAKT-40)

The TAKT-40 is also a new tool created by the Principal Investigator and the dissertation sponsor, Dr. Barbara Wallace, for first time use in this study, and use by the Research Group on Disparities in Health (RGDH). All 40 statements in this True-False test are TRUE, allowing the test to serve as a brief online e-health intervention, while yielding a possible high score of 40—for all True responses. The intent is to provide exposure to online health education that may exposure mothers or parents of children with asthma to a body of knowledge that is accurate, while potentially also increasing their knowledge of and self-efficacy to engage in asthma self-management. The tool was based on a review of literature and research on asthma, while following the concept of using a brief e-health true-false test with all true answers as per prior studies (i.e., Afram, 2019; Aiyedun, 2014).

This tool permits fulfilling two of the study's aims, as follows:

> **1-evaluating the new brief e-health online knowledge test intervention of the TAKT-40**, as an online intervention with a convenience sample of mothers (N=62) of children (ages 6 to 14) diagnosed with asthma; and,
>
> 2-using the TAKT-40 mean knowledge score as one of the **two outcome variables** for the study, for which significant predictors will be obtained (i.e., mothers' **asthma knowledge** as measured by the new 40 item true-false knowledge test with all true answers, referred to as the TAKT-40

Thus, the TAKT-40 provides for the first of two of the study's outcome variables to be predicted via regression analysis: i.e. mothers' **asthma knowledge** (as measured by the TAKT-40).

Finally, the tool allows for obtaining descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part IX: Diffusion of the Innovation of the Asthma Knowledge Test for Parents (DOI-AKTFP-1)

The DOI-AKTFP-1 is a standard tool of the RGDH, that is widely used, typically *after exposure* to a brief online intervention, such as a true-false test with all true answers (e.g., Afram, 2019; Aiyedun, 2014), or after exposure to an e-health video (e.g. Hall, 2014). This tool elicits a "yes" or "no" response to a single question about whether the participant would recommend the online intervention of taking the new Asthma Knowledge Test for Parents (TAKT-40) to others; and, specifically, for this study, recommend it to other mothers of children with asthma. This tool allows for descriptive statistics, including obtaining mean, SD, minimum, maximum, as well as percentage and frequency data.

Part X: Pre- and Post-Knowledge Test – Ratings for Knowledge and Self-Efficacy to Manage Child's Asthma (PRE-A-POST-KT-RF-K-SE-TMCA-8)

This tool was taken from Afram (2019), yet modified to query about knowledge and self-efficacy for asthma and achieving asthma control—both for **before and after** taking *The Asthma Knowledge Test for Parents (TAKT-40)*. For the present study, there is a **Scale 1-Asthma Knowledge** and **Scale 2-Asthma Self-Efficacy**; and, parents rate their **knowledge** and **self-efficacy** for both before/pre-taking the TAKT-40 and after/post-taking the TAKT-40. Of note, **Scale 2-Asthma Self-Efficacy requires ratings for three**

key behaviors: i.e., **1-** taking care of my child with asthma, and helping my child achieve *asthma control*; **2-** talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, **3-** talking to healthcare providers/ pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma.

The use of paired t-tests permits detecting any significant differences in:

- **Scale 1-Asthma Knowledge:** self-ratings for **before/pre-taking the TAKT-40 mean knowledge scores** *versus* **after/post-taking the TAKT-40 mean knowledge scores**
- **Scale 2-Asthma Self-Efficacy:** self-ratings for **before/pre-taking the TAKT-40 mean self-efficacy scores** *versus* **after/post-taking the TAKT-40 mean self-efficacy scores**

Any significant difference in mean scores would suggest that *The Asthma Knowledge Test for Parents (TAKT-40)* may serve as a brief online intervention that has the potential to significantly increase knowledge and self-efficacy from **before/pre-taking the TAKT-40** to **after/post-taking the TAKT-40.**

Also, the **Scale 2-Asthma Self-Efficacy** mean score **provides for the second of two of the study's outcome variables** for which significant predictors will be sought via regression analysis. **This Scale 2-Asthma Self-Efficacy also has three items for permitting the determination of internal consistency, using Cronbach's Alpha.**

Finally, both the **Scale 1-Asthma Knowledge** and **Scale 2-Asthma Self-Efficacy** permit determining mean scores, including standard deviation, minimum and maximum scores, as well as percentages and frequencies.

Part XI: Open Ended Questions on Asthma-Related Stress and Coping Strategies (OEQ-OARS-ACS-2)

Finally, as a mixed-methods study, there is are open-ended questions that will be analyzed as qualitative data for emergent themes and categories, while based on the following closing questions:

> Lastly, please answer the following two open-ended questions, allowing you to freely share.
>
> 1-Please describe what have been the most difficult and stressful parts of caring for your child with asthma? Or, what has been the most difficult and stressful when it comes to helping your child achieve *asthma control*?
>
> 2-Finally, what are your best coping strategies, or most successful strategies, or best ways for helping your child achieve *asthma control*? Please share anything you discovered so other mothers/families can better help their child achieve *asthma control*.

Treatment of the Data

The data will be transferred from the Qualtrics platform into the latest version of SPSS: i.e., 26.0 for data analysis.

Data Analysis Plan

Given a sample of mothers (N=62) of children age 6 to 14 who have been diagnosed with asthma and respond to a social media campaign using a core message on various online platforms (i.e., **"CLICK ON: https://tinyurl.com/Asthma-Survey-for-Mothers - And take the Survey for Mothers of a Child Age 6-14 with Asthma (Takes 15-20 Minutes) for a chance to win one of three $100 Amazon gift cards."**), this study will seek answers to the following research questions—using the *data analysis plans* indicated:

Quantitative Portion of the Study

1-What were the mother's *demographics* (mother's age, race, partner [yes/no], student [yes/no], employment [yes/no], annual household income, highest level of education, number of children)?

Part Ⅰ: Parents' Basic Demographics (P-BD-8)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

2-What information did they provide *about their child with asthma* (age, grade, type of school [urban, suburban, rural, number of years since child's asthma diagnosis, tested for allergies [yes/no], ever prescribed medication [yes/no], currently taking medication [yes/no])? What was the degree of *medication adherence* in the primary home with mother, and in any secondary home (e.g., father, joint custody, prior partner, grandparents, aunts/uncles, etc.)? What was the degree of *asthma impact* (e.g. frequency from child missing school, parents missing work, and from any parental/family experience of a great deal of stress and anxiety?

Part Ⅱ: About Their Child with Asthma (ATCWA-13)

- **Medication Adherence Scale** (2 questions)
- **Asthma Impact Scale** (3 questions)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

3-To what extent did they report *barriers* (0 to 12) to getting their child with asthma to see a healthcare provider or pediatrician (or other specialists) as often as they would like or recommended?

Part Ⅲ: Barriers to Child's Health Care (C-OB-CHC-12)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

4-Was there any *parental history of asthma* (biological father [yes/no], biological mother [yes/no]), and does the *mother currently take medication to self-manage asthma* [yes/no]?

Part Ⅳ: Parental History of Asthma and Any Current Self-management of Asthma with Medication by Mother (PHA-ACSMA-WMBM-4)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

5-To what extent did they present *social desirability* (0 to 10), or were at risk of providing socially desirable responses to survey questions?

Part V: Single Item Rating of Risk of Providing Socially Desirable Responses (SIR-RPSDR-1)

Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages (The regression analysis controls for this variable)

6-To what extent was there *exposure to environmental triggers for asthma within the primary home?*

Part Ⅵ: Exposure to Environmental Asthma Triggers in Primary Home (ETEAT-IPH-16+2) [and 2 screening questions]
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

7-To what extent was there *exposure to potential triggers for asthma within any secondary home*, or where their child lives "some of the time" (i.e., at least 4 days each month—e.g. father, joint custody, mother's other former partner, a grandmother/grandfather, aunt/uncle, etc.)?

Part Ⅶ: Exposure to Environmental Asthma Triggers in Secondary Home (ETEAT-ISH-16+2) [and 2 screening questions]
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

8-What was their level of *asthma knowledge* (i.e. *The Asthma Knowledge Test for Parents*)?

Part Ⅷ: Asthma Knowledge Test for Parents (TAKT-40)
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages
Note: The TAKT-40 is one of two study outcome variables

9-Did they indicate whether they *would or would not diffuse the innovation* of taking the new knowledge test by recommending the test to other parents of children with asthma?

Part Ⅸ: Diffusion of the Innovation of the Asthma Knowledge Test for Parents (DOI-AKTFP-1)
Data Analysis Plan: Descriptive statistics, including means, standard deviations, frequencies, and percentages

10-When comparing their *pre-test taking versus their post-test taking ratings of their asthma knowledge* was there a significant difference? And, was there a significant difference when comparing their *pre-test taking versus their post-test taking ratings of their asthma self-efficacy* for three key behaviors [i.e., 1- taking care of my child with asthma, and helping my child achieve *asthma control*; 2- talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]?

Part Ⅹ: Pre- and Post-Knowledge Test – Ratings for Knowledge and Self-efficacy to Manage Child's Asthma (PRE-A-POST-KT-RF-K-SE-TMCA-8)
- **Scale 1-Asthma Knowledge** (2 questions)
- **Scale 2-Asthma Self-efficacy** (6 questions on 3 key behaviors)
  Note: The Scale 2-Asthma Self-efficacy is the second of the two study outcome variables

Data Analysis Plan: Paired t-tests

11-Were there any significant relationships between selected independent variables and each of **the study outcome/dependent variables of (1) a high asthma knowledge (on**

the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors [i.e., **1-** taking care of my child with asthma, and helping my child achieve *asthma control*; **2-** talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, **3-** talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]?

Data Analysis Plan: Independent t-tests, Pearson Correlations, and Backward Stepwise Regression Analysis

12- What were the significant predictors of **the study outcome/dependent variables of (1) a high asthma knowledge (on the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors** [i.e., **1-** taking care of my child with asthma, and helping my child achieve *asthma control*; **2-** talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, **3-** talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]?

Data Analysis Plan: Backward Stepwise Regression Analysis

Qualitative Portion of Study

113-What were the emergent themes from an analysis of qualitative data in response to open-ended questions—regarding: (1) the most difficult and stressful parts of caring for their child with asthma and helping them achieve asthma control; and (2) their best coping strategies, or most successful strategies, or best ways for helping their child achieve *asthma control*, and anything they discovered and can share so other mothers/families can better help their child achieve *asthma control*?

Part XI: Open Ended Questions on Asthma-Related Stress and Coping Strategies (OEQ-OARS-ACS-2)

Data Analysis Plan: Qualitative data analysis for emergent themes

More specifically, the qualitative data analysis followed steps disseminated for use by the Research Group on Disparities in Health (RGDH), as per the dissertation sponsor, Dr. Barbara Wallace. See **Appendix G** for the qualitative data analysis guide of the RGDH.

Conclusion

This chapter provided the methods used in the present study and included an overview of the study design, study procedures, recruitment of participants, description of

the study participants, and a description of the research instrumentation. The chapter concluded with the data analysis plan.

The next chapter, Chapter IV, Results, will provide the results of data analysis.

Chapter IV

RESULTS

This chapter will provide a detailed presentation of the study results organized by research question. Additionally, this study's findings are presented via multiple tables for purposes of organizing the data.

Data Analysis Results by Study Question

Results for Research Question #1

What were the mother's demographics (mother's age, race, partner [yes/no], student [yes/no], employment [yes/no], annual household income, highest level of education, number of children)?

Part I: Basic Demographics. The study sample was comprised of 62 mothers of children with asthma aged 6 to 14 (N=62). In total, 76 mothers gave consent to participate in the survey. However, the criterion of participants included having to have completed enough of the survey questions so that they provided data for the primary outcome variables of **the study outcome variables of (1) a high asthma knowledge (on the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy)** reduced the sample N=62 for "completers." When comparing these completers (N=62) to non-completers (N=14) (who lacked primary outcome data), no significant differences were found between the two groups.

The sample (N=62) had a *mean number of children of 2.31* (min=1, max=6, SD=1.018), and a *mean age of 39.13* (min=27, max=52, SD=5.635), with 66.1% (n= 41) White, 24.2% Black, and 9.7% (n=6) Hispanic—with 88.7% living with a partner (n=55). The mean level of education was category 4.44 (min=1, max=7, SD=1.386) for *between*

Some College and Master's degrees, with 61.3% of mothers employed (n=38), and a mean annual household income of *category 4.03* (SD=1.727) for *between $100,000 – $199,999*.

See Table 1.

Table 1. *Basic Demographics* (N=62)

	N	%
Mother's Age (N=62)		
Mean age (39.13), SD 5.635), min (27), max (52)		
26-30	3	4.8
31-35	14	22.5
36-40	15	24.2
41-45	24	38.7
46-50	4	6.4
51-55	2	3.2
Mother's Race/Ethnicity (N=62)*		
White	41	66.1
Black/African American	15	24.2
Hispanic/Latino	6	9.7
Asian	1	1.6
Native American	3	4.8
Middle Eastern	1	1.6
Other	1	1.6
Partner Yes/No (N=62)		
Yes	55	88.7
No	7	11.3
Student Yes/No (N=62)		
Yes	3	4.8
No	59	95.2
Employed Yes/No (N=62)		
Yes	38	61.3
No	24	38.7

Table 1 (continued)

	N	%
Mean Income (N=62)		
Mean income (4.03), SD (1.727), min (1), max (9)		
1-$10,000 to $19,000	8	12.9
2-$20,000 to $39,000	5	8.1
3-$40,000 to $49,000	6	9.7
4-$50,000 to $99,999	14	22.6
5-$100,000 to $199,999	21	33.9
6-$200,000 to $299,000	5	8.1
7-$300,000 to $399,000	2	3.2
9-$500,000 to $799,000	1	1.6
Mean Education (N=62)		
Mean education (4.44), SD (1.386)		
min (1), max (7)		
1-Less than high school	1	1.6
2-High school or high school equivalent (GED)	4	6.5
3-Some college	14	22.6
4-2-year college degree (Associate's)	9	14.5
5-4-year college degree (Bachelor's)	17	24.7
6-Master's degree	16	25.8
7-Doctoral Degree (Ph.D., Ed.D., etc.)	1	1.6
Number of Children(N=62)		
Mean number of children (2.31), SD (1.018), Min (1), max (6)		
1	11	17.7
2	31	50.0
3	13	21.0
4	5	8.1
5	1	1.6
6	1	1.6

Results for Research Question #2

What information did they provide about their child with asthma (age, grade, type of school [urban, suburban, rural, number of years since child's asthma diagnosis, tested for allergies [yes/no], ever prescribed medication [yes/no], currently taking medication [yes/no])? What was the degree of medication adherence in the primary home with mother, and in any secondary home (e.g.

father, joint custody, prior partner, grandparents, aunts/uncles, etc.)? What was the degree of asthma impact (e.g. frequency from child missing school, parents missing work, and from any parental/family experience of a great deal of stress and anxiety?

Part II: Child's Information, as Provided by Child's Mother. The *mean age for children was 9.06* (min=6, max=14, SD=2.36). Some 53.3% of children were in grades Kindergarten through 3rd grade, 79% (n=49) attended public school (49%), and there was a *mean of 7.51 years since the asthma diagnosis* (min=1, max=14, SD=2.50), with 98.4% (n=61) of children prescribed medication for asthma management, and 80.6% (n=50) currently taking medication—with 50.0% (n=31) taking medication as prescribed at home, while 30.6% (n=19) were taking medication as prescribed when away from home.

For the extent of negative impacts from asthma on child, parent, and family, findings showed: a majority of students (90.3%) had ever missed school or been absent from school due to asthma; a majority of mothers (83.9%) had ever missed work due to taking care of their child's asthma; and. a majority (98.4%) of mothers and/or family members ever experienced a great deal of stress and anxiety due to the challenges of managing their child's asthma symptoms.

See Table 2.

Table 2. *About Their Child with Asthma* (N=62)

	N	%
How old is this CHILD you will be keeping in mind as you answer questions for this survey? (N=62)		
Mean age (9.06), SD (2.36), Min (6), max (14)		
6	11	17.7
7	8	12.9
8	8	12.9
9	10	16.1
10	11	17.7
11	2	3.2
12	5	8.1
13	4	6.5
14	3	4.8
My CHILD is currently in the following grade: (N=62)		
Kindergarten	6	9.7
1st Grade	7	11.3
2nd Grade	7	11.3
3rd Grade	13	21.0
4th Grade	6	9.7
5th Grade	10	16.1
6th Grade	4	6.5
7th Grade	3	4.8
8th Grade	5	8.1
9th Grade	5	8.1
Other	1	1.6
My CHILD currently attends a: (N=62)		
1- Public School	49	79.0
2- Charter School	6	9.7
3- Parochial School	1	1.6
4- Private School	6	9.7

Table 2 (continued)

	N	%
Please estimate the number of years your child has had asthma—or number of years since diagnosed with asthma? (N=62)		
Mean years (7.51), SD (2.50), Min (1), max (14)		
3 years	4	6.5
4 years	4	6.5
5 years	5	8.1
6 years	7	11.3
7 years	14	22.6
8 years	6	9.7
9 years	8	12.9
10 years	7	11.3
11 years	3	4.8
12 years	3	4.8
14 years	1	1.6
Was your child ever tested for allergies (to find out what they are allergic to)? (N=62)		
Yes	51	82.3
No	11	17.7
Was your child ever prescribed/given any medication for their asthma by their health care provider or pediatrician? (N=62)		
Yes	61	98.4
No	1	1.6
Is your child currently taking any medication for their asthma that has been prescribed/given by a health care provider or pediatrician? (N=62)		
Yes	50	80.6
No	12	19.4

Table 2 (continued)

	N	%
Please rate HOW OFTEN your child is receiving their asthma medication WHEN THEY ARE AT HOME the way they are supposed to, or the way their healthcare provider or pediatrician wants your child to take it. (N=62)		
All the time	31	50.0
Most of the time	8	12.9
Sometimes	9	14.5
Rarely	4	6.5
Never	1	1.6
Not applicable/Child is not Taking Medication at This Time	9	14.5
Please rate HOW OFTEN your child is receiving their asthma medication WHEN THEY ARE NOT AT HOME the way they are supposed to, or the way their healthcare provider or pediatrician wants your child to take it.		
All of the time	19	30.6
Most of the time	9	14.5
Sometimes	11	17.7
Rarely	6	9.7
Never	5	8.1
Not applicable/Child is not Taking Medication at This Time	12	19.4
Extent of negative impacts from asthma on child, parent, and family:		
How often has your child missed school or been absent from school due to asthma? (N=62)		
1- Extremely Often	3	4.8
2- Many Times	12	19.4
3- Sometimes	23	37.1
4- Rarely	18	29.0
5- Never	6	9.7

Table 2 (continued)

	N	%
How often have you or a co-parent/caretaker missed work due to taking care of your child's asthma—whether for visits to an emergency room, a healthcare provider/ pediatrician, or for staying home with your sick child due to their asthma. (N=62)		
1- Extremely Often	2	3.2
2- Many Times	17	27.4
3- Sometimes	16	25.8
4- Rarely	17	27.4
5- Never	10	16.1
How often have you and/or your family members experienced a great deal of stress and anxiety due to the challenges of managing your child's asthma symptoms. (N=62)		
1- Extremely Often	13	21.0
2- Many Times	17	27.4
3- Sometimes	18	29.0
4- Rarely	21.0	13.0
5-Never	1	1.6

Results for Research Question #3

To what extent did they report barriers (0 to 12) to getting their child with asthma to see a healthcare provider or pediatrician (or other specialists) as often as they would like or recommended?

III: Barriers to Child Seeing Providers and Specialists. The prevalence of Barriers to Child's Health Care was a *mean of 3.53* (min=1, max=12, SD=3.192) *for a moderate amount of barriers*. For example, 50% (n=31) of mothers indicated that their work schedule had been a barrier to the child's health care.

See Table 3.

Table 3. *Barriers to Child Seeing Providers and Specialists* (N=62)

	N	%
Mean Barriers to Child's Health Care (3.53) SD (3.192) *Min (1), max (12)* **1- Stress in my life (N=62)**		
Yes	35	56.5
No	27	43.5
2- Lack of Transportation to and from Providers (N=62)		
Yes	7	11.3
No	55	88.7
3- My Work Schedule (N=62)		
Yes	31	50.0
No	31	50.0
4- Lack of Sufficient Hours for when the Clinic is Open/Provider Available (N=62)		
Yes	21	33.9
No	41	66.1
5- Lack of Continuity in Care or Seeing a Different Provider each time (N=62)		
Yes	13	21.0
No	49	79.0
6 - Lack of Trust in Providers and The Medical System (N=62)		
Yes	18	29.0
No	44	71.0
7 – Lack of Insurance (N=62)		
Yes	9	14.5
No	53	85.5
8 – Lack of Finances/Money (N=62)		
Yes	17	27.4
No	45	72.6

Table 3 (continued)

	N	%
9 – Lack of Time, Or Other Demands on my Time (N=62)		
Yes	24	38.7
No	38	61.3
10 – My Own Mental Health Issues (N=62)		
Yes	18	29.0
No	44	71.0
11 – The Health Issues (Physical or Mental) of Others (N=62)		
Yes	16	25.8
No	46	74.2
12 Other/Something Else has been an obstacle/barriers* (N=62)		
Yes	51	82.3
No	11	17.7
***Other Barriers (N=9)**		

Results for Research Question #4

Was there any parental history of asthma (biological father [yes/no], biological mother [yes/no]), and does the mother currently take medication to self-manage asthma [yes/no]?

Part IV: Parental History of Asthma. The majority (93.5%, n= 58) of biological mothers reported having been diagnosed with asthma themselves, while 35.5% (n=22) of fathers were diagnosed with asthma.

See Table 4.

Table 4. *Parental History of Asthma* (N=62)

	N	%
Child's Father Diagnosed with Asthma (N=62)		
Yes	22	35.5
No	36	58.1
Not Sure/Don't Know	4	6.5
Child's Biological Mother (Not Adopted) (N=62)		
Yes	58	93.5
No	4	6.5
Child's Mother Diagnosed with Asthma (N=62)		
Yes	29	46.8
No	33	53.2
Mother's Current Asthma Status (N=62)		
1 - I Am Currently (now) Taking Asthma Medication	9	14.5
2 – I Am Not Currently (Now) Taking Asthma Medication (No Asthma or No Need to Take Medication for Asthma)	5	8.1
3 – I Used to Take Asthma Medication, But No Longer Do	14	22.6
4 – I Have Never Had A Need to Take Asthma Medication in my Entire Life	1	1.6
No Answer	33	53.2

Results for Research Question #5

To what extent did they present social desirability (0 to 10), or were at risk of providing socially desirable responses to survey questions?

Part V: Social Desirability. The sample's **social desirability mean** was 3.39 (min 0, max 11, SD=3.107), suggesting a *low level of social desirability*. As a note, the regression will control for social desirability.

See Table 5.

Table 5. *Social Desirability* (N=62)

	N	%
I sometimes say things that I think will please people, or what I think they want to hear—versus the honest truth, which might be difficult or painful for other people to hear and accept, or might lead them to judge me harshly...		
I rate myself on a scale of 0 to 10, as follows: (N=62) *Mean Social Desirability (3.39), SD (3.107) min (0), max (11)*		
1 - 0 – I am not like this at all	18	29.0
2 – 1	3	4.8
3 – 2	12	19.4
4 – 3	2	3.2
5 – 4	2	3.2
6 – 5	6	9.7
7 – 6	6	9.7
8 – 7	7	11.3
9 – 8	2	3.2
10 – 9	2	3.2
11 - 10 – I am like this all the time	2	3.2

Results for Research Question #6

To what extent was there exposure to environmental triggers for asthma within the primary home?

Part VI: Exposure to Potential Environmental Triggers for Asthma Within the Primary Home. The majority **(**95.2%, n=59) of mothers reported their child with asthma lived with them, and a majority (83.9%, n=52) had partners that always lived with them. Also a majority (91.9%, n=57) never smoked within the home, while the same majority (91.9%, n=57) had partners who never smoked within the home.

Some 33.9% (n=21) lived in an urban environment and 43.5% (n=27) lived in a suburban environment—with most (64.5%, n=40) living in a free standing single home. For the age of the structure housing them, 40.3%, (n=25) estimated the structure was

50 years old, while 50.0% (n=31) mothers rated the quality of their building structure as *Very Good*. Most mothers (61.3%, n=38) never had a problem with pests in their home.

Although 69.4% (n=43) of mothers surveyed report that no smokers live in the home, of the mothers reporting smokers, 24.2% (n=15) report that the smokers where they live *always go outside to smoke*; and 21.0% (n=13) report that the smokers who live in the home *never smoke inside*.

Some 54.8% (n=34) of mothers reported a cat and/or dog living in the primary home with the child with asthma. Lastly, 14.5% (n=9) reported being *not close at all* to routes for large trucks, while 41.9% (n=26) were *somewhat close* to routes for large trucks.

Of note, **for subsequent data analysis the data for extent of exposure to environmental triggers for asthma was dichotomized, while based on 7 yes-no scores for exposure to one of the following 7 categories of risk**: 1-any smoker in the home (yes=1/no=0); 2-live in urban setting (yes=1/no=0); 3-lives in old housing stock (yes=1, $\geq$ 25 years/no=0); 4-lives in poor quality housing (yes=1/no=0); 5-lives with pests in home (yes=1/no=0); 6-lives with pets in home (yes=1/no=0); 7-lives near large truck routes (yes=1/no=0). Further, t**he 8th category of risk arises from the next Part, based on risks in any secondary home**, with all data collectively reduced to a dichotomized measure (yes=1/no=0) for any risks at all present in that secondary home. The **result is a score for extent of exposure to environmental asthma triggers for the child, based on a score of 0 to 8—as will become apparent in subsequent data analyses.**

See Table 6.

Table 6. *Extent of Exposure to Environmental Asthma Triggers for the Child in the Primary Home* (N=62)

	N	%
My child lives with me (N=62)		
1 = Always	59	95.2
2 = Almost Always	3	4.8
I have a partner who lives with me or visits frequently, including spending the night (N=62)		
1 = Always	52	83.9
2 = Almost Always	1	1.6
3 = Sometimes	1	1.6
4 = Rarely	3	4.8
5 = Never	5	8.1
I smoke cigarettes, or vape, or smoke something else such as medical marijuana/other marijuana inside my home (N=62)		
2 = Almost Always	1	1.6
3 = Sometimes	3	4.8
4 = Rarely	1	1.6
5 = Never	57	91.9
My partner who lives with me or visits often smokes cigarettes, or vapes, or smokes something else (e.g. medical marijuana/other marijuana, etc.) inside my home: (N=62)		
1 = Always	1	1.6
3 = Sometimes	1	1.6
4 = Rarely	3	4.8
5 = Never	57	91.9
Where we live may best be described as: (N=62)		
1 – Urban	21	33.9
2 – Suburban	27	43.5
3 – Rural	11	17.7
4 – I Don’t Know	3	4.8

Table 6 (continued)

	N	%
Where we live may also be described as: (N=62)		
1 – An Apartment Building	13	21.0
2 – A Condominium	1	1.6
3 – A Row House	3	4.8
4 – A Free Standing Single House	40	64.5
5 – A Free Standing Twin House	4	6.5
6 – Other ("multi-family home")	1	1.6
Where we live (apartment, condo, house, etc.) has been there closest to (your best guess) (N=62)		
1 – 100 Years	4	6.5
2 – 50 Years	25	40.3
3 – 25 Years	16	25.8
4 – 10 Years	7	11.3
5 – 5 Years	5	8.1
6 – Less than 2 years	5	8.1
I would rate where we live… For overall quality of the building structure, and the building's state of repair or disrepair, and for any problems with leaks, holes, heating, ability to control heat, air circulation, etc.: (N=62)		
1 – Excellent	17	27.4
2 – Very Good	31	50.0
3 – Fair	10	16.1
4 – Poor	3	4.8
5 – Very Poor	1	1.6
I would rate where we live… For having a problem with roaches: (N=62)		
1 = Always	2	3.2
2 = Almost Always	3	4.8
3 = Sometimes	6	9.7
4 = Rarely	13	21.0
5 = Never	38	61.3

Table 6 (continued)

	N	%
I would rate where we live… For having a problem with mice: (N=62)		
1 = Always	2	3.2
2 = Almost Always	3	4.8
3 = Sometimes	8	12.9
4 = Rarely	10	16.1
5 = Never	39	62.9
I would rate where we live… For having a problem with rats: (N=62)		
1 = Always	2	3.2
2 = Almost Always	1	1.6
3 = Sometimes	4	6.5
4 = Rarely	5	8.1
5 = Never	50	80.6
I would rate where we live… For having a problem with squirrels: (N=62)		
1 = Always	3	4.8
2 = Almost Always	3	4.8
3 = Sometimes	9	14.5
4 = Rarely	9	14.5
5 = Never	38	61.3
I would rate where we live… For having a problem with raccoons: (N=62)		
1 = Always	1	1.6
2 = Almost Always	4	6.5
3 = Sometimes	10	16.1
4 = Rarely	9	14.5
5 = Never	38	61.3

Table 6 (continued)

	N	%
Where we live has the following number of people also living here: (N=55)		
1	2	3.2
2	9	14.5
3	11	17.7
4	20	32.3
5	6	9.7
6	4	6.5
10	1	1.6
14	1	1.6
20	1	1.6
Where we live has the following number of smokers (e.g. cigarettes, vaping, marijuana, etc.) also living here: (N=15)		
1	7	11.3
2	4	6.5
3	1	1.6
4	1	1.6
5	1	1.6
14	1	1.6
When it comes to going outside to smoke, the smokers where we live: (N=62)		
1 – Always go outside to smoke	15	24.2
2 – Almost always go outside to smoke	3	4.8
3 – Sometimes go outside to smoke	1	1.6
6 – Not Applicable/No smokers live there	43	69.4
When it comes to smoking inside the house, the smokers where we live: (N=62)		
1 – Always smoke inside	1	1.6
3 – Sometimes smoke inside	2	3.2
4 – Rarely smoke inside	2	3.2
5 – Never smoke inside	13	21.0
6 – Not Applicable/No smokers live there	44	71.0

Table 6 (continued)

	N	%
Where we live has the following number of cats and/or dogs also living inside with us: (N=34)		
1	19	30.6
2	13	21.0
3	2	3.2
For where we live, I would rate our closeness to roads, streets, and highways where there are large trucks that regularly drive by as: (N=62)		
1 - Not close at all	9	14.5
2 – Somewhat close	26	41.9
3 – Neither close nor far	10	16.1
4 – Very close	9	14.5
5 – Extremely close	8	12.9

Note: For subsequent data analysis the data for **extent of exposure to environmental triggers for asthma** was dichotomized, while based on 7 yes-no scores for exposure to one of the following 7 categories of risk: 1-any smoker in the home (yes=1/no=0); 2-live in urban setting (yes=1/no=0); 3-lives in old housing stock (yes=1, $\geq$ 25 years/no=0); 4-lives in poor quality housing (yes=1/no=0); 5-lives with pests in home (yes=1/no=0); 6-lives with pets in home (yes=1/no=0); 7-lives near large truck routes (yes=1/no=0).

Results for Research Question #7

> *To what extent was there exposure to environmental triggers for asthma within any secondary home, or where their child lives "some of the time" (i.e., at least 4 days each month—e.g. father, joint custody, mother's other former partner, a grandmother/grandfather, aunt/uncle, etc.)?*

Part VII: Exposure to Environmental Triggers for Asthma Within Any Secondary Home, or Where the Child Lives "Some of the Time" (i.e., at least 4 days each month). Only 17.7% (n=11) of children lived with someone else at least 4 days out of every month, including spending the night there—qualifying as their secondary home. All of the data for the questions on this survey part were findings for very low frequency events. Hence, all of the data was **dichotomized for yes=1 or no=0 for the presence of any exposure to environmental asthma triggers for the child in the secondary home**—for use in subsequent data analysis. This was a newly created summary variable

or index for the **asthma environmental risk factor # 8—for any asthma risk from secondary home** (yes=1, no=0)—which was added as the final variable to a list of 7 other primary home risk factors discussed above, as discussed for the prior research questions' results; this led to a total of 8 risk factors, with **this survey part giving rise to the 8th risk factor**.

See Table 7.

Table 7. *Any Exposure (Yes/No) to Environmental Asthma Triggers for the Child in Any Secondary Home* (N=62)

	N	%
***Note:** All of the low frequency events reported in this table were reduced to a summary dichotomized variable or index for any (Yes/No) Exposure to Environmental Asthma Triggers in Any Secondary Home for the Child		
Does your child live with someone else at least 4 DAYS OUT OF EVERY MONTH, including spending the night there? For example, you may have joint custody, or the child spends time with their father, your former partner, or a grandmother/grandfather, or aunt/uncle, etc.] (N=62)		
Yes	11	17.7
No	51	82.3
Please estimate the number of days per month that your child with asthma lives some of the time with someone else (e.g., father, joint custody, your former partner, a grandmother/grandfather, aunt/uncle, etc.), including spending the night there. (N=10)		
2	1	1.6
4	3	4.8
6	2	3.2
7	2	3.2
12	1	1.6
15	1	1.6

Table 7 (continued)

	N	%
For where my child lives some of the time, the person mainly responsible (father, your former partner, a grandparent, aunt/uncle, etc.). for my child at that home smokes cigarettes, or vapes, or smokes something else (e.g. medical marijuana/other marijuana) in that home. (N=10)		
1 – Always	1	1.6
3 – Sometimes	3	4.8
4 – Rarely	2	3.2
5 – Never	4	6.5
For where my child lives some of the time, the person mainly responsible for my child HAS A PARTNER in that home who smokes cigarettes, or vapes, or smokes something else (e.g. medical marijuana/other marijuana) in that home. (N=10)		
1 – Always	1	1.6
2 - Almost Always	1	1.6
3 – Sometimes	1	1.6
5 – Never	6	9.7
6 – I don't know	1	1.6
For where my child lives some of the time (e.g. shared custody, grandparents, etc.), that setting may best be described as: (N=10)		
1 – Urban	6	9.7
2 – Suburban	3	4.8
3 – Rural	1	1.6
For where my child lives some of the time, it may also be described as: (N=10)		
1 – An Apartment Building	6	9.7
3 – A Row House	1	1.6
4 – A Free Standing Single House	2	3.2
5 – A Free Standing Twin House	1	1.6
Where my child lives some of the time (apartment, condo, house, etc.) has been there closest to (your best guess): (N=10)		
1 – 100 Years	3	4.8
2 – 50 Years	3	4.8
3 – 25 Years	2	3.2
4 – 10 Years	2	3.2

Table 7 (continued)

	N	%
For overall quality of the building structure, and the building's state of repair or disrepair, and for any problems with leaks, holes, heating, ability to control heat, air circulation, etc.: (N=10)		
1 – Excellent	1	1.6
2 – Very Good	2	3.2
3 – Fair	5	8.1
4 – Poor	2	3.2
I would rate where they live....For having a problem with roaches: (N=10)		
1 = Always	2	3.2
3 = Sometimes	2	3.2
4 = Rarely	2	3.2
5 = Never	4	6.5
I would rate where they live....For having a problem with mice: (N=10)		
1 = Always	1	1.6
3 = Sometimes	4	6.5
4 = Rarely	1	1.6
5 = Never	4	6.5
I would rate where they live....For having a problem with rats: (N=10)		
3 = Sometimes	5	8.1
5 = Never	5	8.1
I would rate where they live....For having a problem with squirrels: (N=10)		
1 = Always	1	1.6
3 = Sometimes	1	1.6
4 = Rarely	3	4.8
5 = Never	5	8.1
I would rate where they live....For having a problem with raccoons/other: (N=10)		
2 = Almost Always	1	1.6
3 = Sometimes	1	1.6
4 = Rarely	3	4.8
5 = Never	5	8.1

Table 7 (continued)

	N	%
For where my child lives some of the time, the following number of people also live there: (N=10)		
3	6	9.7
4	3	4.8
5	1	1.6
For where my child lives some of the time, the following number of smokers (e.g. cigarettes, vaping, marijuana, etc.) also live there (N=7)		
I don't know	2	3.2
1	3	4.8
2	2	3.2
When it comes to going outside to smoke, the smokers there: (N=10)		
1 – I don't know	2	3.2
2 – Always go outside to smoke	2	3.2
3 – Almost always go outside to smoke	1	1.6
4 – Sometimes go outside to smoke	3	4.8
7 – Not Applicable/No smokers live there	2	3.2
When it comes to smoking inside the house, the smokers there: (N=10)		
1 – I don't know	2	3.2
3 – Sometimes smoke inside	2	3.2
4 – Rarely smoke inside	1	1.6
5 – Never smoke inside	3	4.8
6 – Not Applicable/No smokers live there	2	3.2
Where we live has the following number of cats and/or dogs also living inside with us: (N=10)		
1	3	4.8
2	1	1.6

Table 7 (continued)

For where we live, I would rate our closeness to roads, streets, and highways where there are large trucks that regularly drive by as: (N=10)		
2 - Not close at all	1	1.6
3 – Somewhat close	5	8.1
4 – Neither close nor far	1	1.6
6 – Extremely close	3	4.8

***Note:** For subsequent data analyses the data presented in this table was used to create a new dichotomized summary variable or index capturing **any (Yes=1/No=0) exposure to environmental triggers for asthma in any secondary home**. This possible 1 (yes) point score for **any (Yes=1/No=0) exposure to environmental triggers for asthma in any secondary home** was added to 7 prior possible 1 (yes) point scores for **extent of exposure to environmental triggers for asthma in the primary home**. Together, these scores created a total of 8 categories of **total environmental triggers for asthma risk for a child**, combining: 1-any smoker in the home (yes=1/no=0); 2-live in urban setting (yes=1/no=0); 3-lives in old housing stock (yes=1, ≥ 25 years/no=0); 4-lives in poor quality housing (yes=1/no=0); 5-lives with pests in home (yes=1/no=0); 6-lives with pets in home (yes=1/no=0); 7-lives near large truck routes (yes=1/no=0); and, 8-**any exposure to environmental triggers for asthma in any secondary home (yes=1/no=0)—based on the data in this table.**

Results for Research Question #8

What was their level of asthma knowledge (i.e., The Asthma Knowledge Test for Parents)?

Part VIII: The Asthma Knowledge Test for Parents (TAKT-40). For the mothers' level of asthma knowledge, *the TAKT-40 mean score was 37.90* (Min=22, max=40, SD=2.768) for *high asthma knowledge*.

For example, the top ranked knowledge items that all mothers knew were "True," included:

- (Item # 3) *An important goal is asthma control, or achieving (gaining) control of a child's asthma—so asthma attacks are avoided* (100.0%, n=62);
- (Item # 6) *Achieving asthma control includes parents and children knowing the importance of the child regularly taking any other maintenance medications exactly as they were prescribed (how told to take)* (100.0%, n=62);
- (Item # 10) *Parents and family members can take action and perform certain behaviors to reduce a child's asthma attacks, and work together to achieve the goal of asthma control* (100.0%, n=62);
- (Item # 12) *For a child to achieve asthma control and maintain (keep) that control over time, it is important that no one smokes around the child, such as in a car or in any room or space shared with the child* (100.0%, n=62);

- (Item # 13) *For a child to achieve asthma control and maintain (keep) that control over time, it is important that they are not exposed to second-hand tobacco smoke (or marijuana, etc.) from someone smoking around them* (100.0%, n=62).

Mothers had less knowledge of African American children having more severe asthma symptoms (Item # 17), and African American children living in urban areas were more likely to need specialist providers (Item # 18)—with 19.4% (n=12) endorsing these items as False.

See Table 8.

Table 8. *The Asthma Knowledge Test for Parents (TAKT-40)* (N=62)

	N	%
1. Asthma is a chronic disease, or chronic respiratory disease that involves the lungs and difficulty breathing; and, asthma is increasing in children, as the most common chronic disease for children. (N=62)		
True	59	95.2
False	3	4.8
2. A parent may hear their child wheezing (making a whistling sound while breathing), or may notice their child coughing and having trouble breathing (shortness of breath)—as some of the first signs of asthma. (N=62)		
True	60	96.8
False	2	3.2
3. An important goal is asthma control, or achieving (gaining) control of a child's asthma—so asthma attacks are avoided. (N=62)		
True	62	100.0
4. Achieving asthma control requires keeping regular medical visits with a healthcare provider/pediatrician, receiving prescriptions (refills) for medication, and making sure medication is taken the way it was prescribed (how told to take). (N=62)		
True	61	98.4
False	1	1.6
5. Achieving asthma control requires noticing when asthma symptoms first start (e.g., trouble breathing) so the child can take medication immediately (e.g., use of a pump, or rescue inhaler to relax lung muscles and widen airways [bronchi] in the lungs). (N=62)		
True	61	98.4
False	1	1.6

Table 8 (continued)

	N	%
6. Achieving asthma control includes parents and children knowing the importance of the child regularly taking any other maintenance medications exactly as they were prescribed (how told to take). (N=62)		
True	62	100.0
7. With asthma control, a child can avoid missing school, avoid the emergency room and hospital stays, avoid frequent visits with a healthcare provider/pediatrician—and, a parent can avoid missing work, as well as a great deal of stress and anxiety. (N=62)		
True	61	98.4
False	1	1.6
8. With asthma control, a child can avoid the loss of lung function, avoid long-lasting damage to the lungs, and avoid developing chronic pulmonary disease or COPD later in life. (N=62)		
True	59	95.2
False	3	4.8
9. Parents, family members, and anyone who lives with/spends time with a child with asthma (extended family) ALL have an important role to play in asthma control. (N=62)		
True	61	98.4
False	1	1.6
10. Parents and family members can take action and perform certain behaviors to reduce a child's asthma attacks, and work together to achieve the goal of asthma control. (N=62)		
True	62	100.0
11. For a child to achieve asthma control and maintain (keep) that control over time, it is important that no one smokes in the home—or performs the behavior of going outside to smoke. (N=62)		
True	61	98.4
False	1	1.6
12. For a child to achieve asthma control and maintain (keep) that control over time, it is important that no one smokes around the child, such as in a car or in any room or space shared with the child. (N=62)		
True	62	100.0
13. For a child to achieve asthma control and maintain (keep) that control over time, it is important that they are not exposed to second-hand tobacco smoke (or marijuana, etc.) from someone smoking around them. (N=62)		
True	62	100.0

Table 8 (continued)

	N	%
14. Second-hand smoke, or someone smoking around a child with asthma is a common trigger for an asthma attack, or a trigger that makes asthma get worse with the loss of asthma control. (N=62)		
True	62	100.0
15. There may be many triggers for a child having an asthma attack, or for making asthma worse; and, it is important to help a child avoid these triggers, as much as possible. (N=62)		
True	62	100.0
16. It is important for a child to be tested for allergies by a specialist provider to discover the child's specific triggers (e.g., mold, dust) for an asthma attack or for making asthma worse. (N=62)		
True	59	95.2
False	3	4.8
17. It is very important that the place where a child with asthma lives (and sleeps) DOES NOT have triggers for asthma attacks or making asthma worse, as much as possible. (N=62)		
True	61	98.4
False	1	1.6
18. Compared to White children, African American children with asthma have more severe symptoms, asthma control is harder for them to achieve, and they have much higher rates of asthma when living in an urban area. (N=62)		
True	50	80.6
False	12	19.4
19. An African American child living in an urban area is more likely to need treatment from specialist providers (experts in asthma care). (N=62)		
True	50	80.6
False	12	19.4
20. A child's home environment (where they live, what is around them) directly impacts asthma control; and, home visits by experts can allow them to point out triggers in the home and recommend changes. (N=62)		
True	57	91.9
False	5	8.1

Table 8 (continued)

	N	%
21. It is very important that a child with asthma receives or takes their prescribed (given/told to take) medications daily and correctly, in order to achieve asthma control. (N=62)		
True	59	95.2
False	3	4.8
22. When parents were so distrustful of doctors/medical system that they did not give their children the medications prescribed for asthma, then it was found that their children's asthma got worse. (N=62)		
True	55	88.7
False	7	11.3
23. A medication usually prescribed (given) for a child with asthma is a bronchodilator (or rescue inhaler for emergencies) that widens and opens (dilates) airways in the lungs and increases airflow to the lungs—making it easier to breathe, and helping with coughing and wheezing. (N=62)		
True	61	98.4
False	1	1.6
24. Some bronchodilators (rescue inhalers for emergencies) treat asthma symptoms that come on suddenly, unexpectedly, or with exercise/physical activity; they are fast-acting and work quickly within a few minutes to improve breathing. (N=62)		
True	60	96.8
False	2	3.2
25. Some bronchodilators are short-acting and provide relief from asthma symptoms for 4 to 5 hours. (N=62)		
True	59	95.2
False	3	4.8
26. If a child only has symptoms of asthma just once in a while (intermittent) and/or symptoms are mild, then the healthcare provider/pediatrician may prescribe (give/told to take) a short-acting bronchodilator for use, as needed. (N=62)		
True	57	91.9
False	5	8.1
27. Bronchodilators can be prescribed (given) in three forms: in a rescue inhaler, or in a tablet or pill form to be taken by mouth (oral), or in a liquid form. (N=62)		
True	45	72.6
False	17	27.4

Table 8 (continued)

	N	%
28. A bronchodilator in the form of a rescue inhaler for emergencies can be held in a child's hand and easily carried in a pocket or backpack, for example. (N=62)		
True	61	98.4
False	1	1.6
29. Usually, a child is prescribed (given/told to take) a metered dose inhaler that provides a "measured" (exact) amount of the medication to the lungs when the pump device is squeezed by hand. (N=62)		
True	61	98.4
False	1	1.6
30. Some children use a spacer; their rescue inhaler, or metered dose inhaler is placed in a plastic tube (called a spacer) that delivers into the lungs an exact amount of medication, while adding a few minutes to the task of a child inhaling medication. (N=62)		
True	58	93.5
False	4	6.5
31. The liquid form of a bronchodilator is sometimes used at home in an asthma nebulizer; this is a portable machine that turns the liquid into tiny droplets a child breathes into their lungs through a facemask placed over the mouth and nose. (N=62)		
True	62	100.0
32. If a child needs to take a fast-acting bronchodilator medication every day, this daily use indicates asthma control has not been achieved; the child likely needs a long-acting medication prescribed (given) by their healthcare provider/pediatrician. (N=62)		
True	55	88.7
False	7	11.3
33. A long-acting bronchodilator that may be prescribed for a child by a healthcare provider/pediatrician is an inhaled corticosteroid that is used over the long-term (months, years) to help a child achieve asthma control. (N=62)		
True	56	90.3
False	6	9.7
34. It can take three years with a child and parent working together with a healthcare provider/pediatrician to achieve asthma control; this should include developing an asthma action plan (what to do, depending on symptoms) for preventing asthma attacks and achieving asthma control. (N=62)		
True	51	82.3
False	11	17.7

Table 8 (continued)

	N	%
35. The most important action for a child to achieve asthma control may be taking an inhaled corticosteroid, or an inhaled steroid—and taking it as prescribed (taking exactly how told to take). (N=62)		
True	54	87.1
False	8	12.9
36. The symptoms of asthma are different in a child compared to an adult; and, a parent with asthma cannot assume that what they do for the management of their personal asthma will also work for their child's asthma. (N=62)		
True	58	93.5
False	4	6.5
37. Asthma symptoms may be triggered by dust (mites), indoor pollution (cleaning products), hot or cold weather, fragrances/scents, odors, mold (from storm floods), some food additives/chemicals in food, pollen (from plants, or a season when plants are producing more pollen), or outdoor pollution (traffic) with fumes/toxins from diesel or gasoline. (N=62)		
True	62	100.0
38. Asthma symptoms are worse at night for many children—and this is called nocturnal asthma (night time asthma). (N=62)		
True	60	96.8
False	2	3.2
39. Nocturnal asthma, and being up at night coping with symptoms of asthma, leads to an increase in children being absent from school, and/or being moody the next day—with parents also missing sleep (and being moody). (N=62)		
True	62	100.0
40. Having a good diet and nutrition is important for a child with asthma, helping to protect the child and helping to achieve asthma control. (N=62)		
True	60	96.8
False	2	3.2

Results for Research Question #9

Did they indicate whether they would or would not diffuse the innovation of taking the new knowledge test by recommending the test to other parents of children with asthma?

Part IX: Diffusion of Innovation Screening. A majority of mothers (77.4%, n=48) indicated they would recommend taking ***The Asthma Knowledge Test for Parents (TAKT-40)*** to others with a child with asthma (N=48).

See Table 9.

Table 9. *Diffusion of the Innovation of the TAKT-40 as Brief E-Health* (N=62)

	N	%
Would you recommend taking The Asthma Knowledge Test for Parents to others with a child with asthma?		
No	5	8.1
Yes	48	77.4
Unsure	9	14.5

Results for Research Question #10

*When comparing their pre-test taking versus their post-test taking ratings of their **asthma knowledge** was there a significant difference? And, was there a significant difference when comparing their pre-test taking versus their post-test taking ratings of their **asthma self-efficacy** for three key behaviors [i.e., 1- taking care of my child with asthma, and helping my child achieve asthma control; 2-talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/ pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]?*

Part X: Pre- and Post-Knowledge Test – Ratings for Knowledge and Self-efficacy to Manage Child's Asthma (PRE-A-POST-KT-RF-K-SE-TMCA-8). Of note, the Asthma Self-Efficacy scale based on three items (three behaviors) had very good internal constancy (i.e. Cronbach's Alpha of 0.814)—producing a post-test mean

global self-efficacy of 5.548 **for 80% confident (Min=4, Max=6, SD= .512) to perform the three asthma management behaviors.**

Paired T-Tests. More specifically, **paired t-test**s were used to evaluate the impact of taking the TAKT-40.

First, paired t-tests were used to compare the mothers' **self-rated asthma knowledge** for before/pre-taking the TAKT-40 (Mean=4.92, SD=.911) versus after/post-taking the TAKT-40 (Mean=5.10, SD=.824)—with **the after/post-taking TAKT-40 self-rating for asthma knowledge being higher**, **achieving significance at p < .05** (t= -2.098, df=61, p=.040).

Secondly, paired t-tests were used to further evaluate the impact of taking the TAKT-40, comparing the mothers' **self-rated self-efficacy for performing each of the three asthma management behavior**s for before/pre-taking the TAKT-40 versus after/post-taking the TAKT-40, with mixed findings, as follows:

1- for **taking care of my child with asthma, and helping my child achieve asthma control**, comparing the before/pre-taking the TAKT-40 mean (= 5.40, SD=.735) versus the after/post-taking the TAKT-40 mean (=5.53, SD=.646)—**with the after/post-taking the TAKT-40 self-rating for caring for their child <u>being higher</u>, <u>achieving significance</u> at p < .05** (t= -2.204, df=61, p=.031);
2- for **talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms**, comparing the before/pre-taking the TAKT-40 mean (= 5.42, SD=.801) versus the after/post-taking the TAKT-40 mean (=5.53, SD=.620))—**with the after/post-taking the TAKT-40 self-rating for talking to their child <u>being higher</u>, <u>failing to achieve significance</u> at p < .05** (t= -1.473, df=61, p=.146);
3- for **talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma,** comparing the before/ pre-taking the TAKT-40 mean (=5.42, SD=.759) versus the after/post-taking the TAKT-40 mean (=5.58, SD= .529))—**with the after/post-taking the TAKT-40 self-rating for talking to provider <u>being higher</u>, <u>failing to achieve significance</u> at p < .05** (t= -2.450, df=61, p=.17).

See Table 10.

Table 10. *Paired T-Tests Comparing Before/Pre-TAKT-40 Versus After/Post-TAKT-40 for Self-Ratings of Asthma Knowledge and Self-Efficacy for 3 Asthma Management Behaviors*

	Asthma Knowledge & Self-Efficacy			*t*-test		
	N	M	SD	*T*	Df	P
Asthma Knowledge				-2.098	61	.040*
Asthma Knowledge, Before/Pre-test TAKT-40	62	4.92	.911			
Asthma Knowledge, After/Post-test TAKT-40	62	5.10	.824			
Self-Efficacy For Behavior 1 of Caring for Child				-2.204	61	.031*
More Self-Efficacy Caring for Child, Before/Pre-test TAKT-40	62	5.40	.735			
More Self-Efficacy Caring for Child, After/Post-test TAKT-40	62	5.53	.646			
Self-Efficacy For Behavior 2 of Talking to Child				-1.473	61	.146
Self-Efficacy for Talking to Child, Before/Pre-test TAKT-40	62	5.42	.801			
Self-Efficacy Talking to Child, After/Post-test TAKT-40	62	5.53	.620			
Self-Efficacy For Behavior 3 of Talking to Provider				-2.450	61	0.17*
More Self-Efficacy Talking to Provider, Before/Pre-test TAKT-40	62	5.42	.759			
More Self-Efficacy Talking to Provider, After/Post-test TAKT-40	62	5.58	.529			

*p<.05, **p<.01, ***p<.001

Results for Research Question #11

Were there any significant relationships between selected independent variables and each of the study outcome/dependent variables of (1) a high asthma knowledge, and (2) a high asthma self-efficacy for the three key behaviors [i.e., 1- taking care of my child with asthma, and helping my child achieve asthma

control; 2- talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]?

Independent T-Tests Comparing Groups. In total, four groups (Bonferroni Adjustment Significance, 0.05/4, $p < 0.0125$) were compared on the outcome **variables of (1) a high asthma knowledge (on the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors**. When comparing the groups of White (yes/no), if had partner (yes/no), if employed (yes/no), and if biological father or mother had asthma (yes/no), no group comparisons were significant.

Pearson's Correlations. Correlations between 8 independent variables (Bonferroni Adjustment Significance, 0.05/8, $p < 0.006$) were measured against the outcome **variables of (1) a high asthma knowledge (on the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors**.

No significant correlations were found with the outcome variable of **(2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors**. and the independent variables—while there was *one non-significant trend*: i.e., *the higher the asthma self-efficacy, then the fewer barriers to child's health care* ($r= -.302$, $p= .017$).

However, significant correlations were found between the **variable of (1) a high asthma knowledge (on the TAKT-40),** and the independent variables. **The higher the score for asthma knowledge (on the TAKT-40),** then**:**

- *the **higher** the annual household income ($r= 0.333$, $p= .008$)*

- *the **highe**r the level of education (r= .353, p= .005)*
- *the **lower** the number of children (r = -.432, p= .000)*

See Table 11.

Table 11. *Correlations Between Selected Variables and Higher Asthma Knowledge and Higher Asthma Self-Efficacy Post-Test*

	Higher Asthma Knowledge		Higher Asthma Self-Efficacy Post-Test	
	Pearson's R	P	Pearson's R	P
Participant Age	-.082	.525	-.055	.670
Income Annual Household	.333	.008**	-.014	.913
Participant's Level of Education	.353	.005**	-.111	.391
Number of Children	-.432	.000***	-.087	.504
Extent of negative impacts from asthma on child, parent, and family	.277	.029*	.070	.591
Extent of Barriers to Child's Health Care	-.024	.855	-.302	.017*
#Extent of Environmental Asthma Risk Exposures	.073	.575	-.171	.183
Social Desirability	-.049*	.706	-.084	.516

*p<.05, **p<.01, ***p<.001 Bonferroni Adjustment Significance (.05/8, p< .006).
Note: All p values above .006 are considered non-significant; and, only those below .006 are considered statistically significant.
#Note: This variable was based on 7 yes=1/n=0 scores for environmental asthma triggers in the primary home; and 1 yes=1/0=no score for any environmental asthma triggers in the secondary home—for a total 8-point score represented in this variable.

Results for Research Question #12

What were the significant predictors of the study outcome/dependent variables of (1) a high asthma knowledge, and (2) a high asthma self-efficacy for the three key behaviors [i.e., 1- taking care of my child with asthma, and helping my child achieve asthma control; 2- talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma]?

Backwards Stepwise Regression. The intent of the backwards stepwise regressions was to identify the significant predictors—while controlling for social desirability—for **the study outcome/dependent variables of (1) a high asthma knowledge (on the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors.**

For the backwards stepwise regression to identify the significant predictors of **the study outcome/dependent variables of (1) a high asthma knowledge (on the TAKT-40)** began with a pool of 10 independent variables of interest. The following dichotomous variables were selected for inclusion in the model: ethnicity white—yes/no; partner—yes/no; employed—yes/no; parental atopy of asthma/biological father or mother has history of asthma—yes/no. The following continuous variables were selected for inclusion in the model: participant age; annual household income; participant education; number of children; extent of negative impacts from asthma on child, parent, and family; and more barriers to child's health care.

The model was run, while at each step it removed the least significant variable. The model was then re-run and the regression continued, removing one variable at a time, to provide a successive selection and ordering of variables, as per Mantel (1970). The regression continued until all remaining variables in the model were significantly associated with the dependent variable (i.e., $p<0.05$).

There were risks in this study, given both the use of backward stepwise selection and a small sample size. As per Babyak (2004), these risks include the "primary problem with automated selection," which occurs "under the most typical conditions we see in medical and psychological research" (p. 416). More specifically, this risk involves the

use of "moderate-to-small sample sizes and many possible predictors, many of which are correlated with one another" (p. 416). As a result, there is the "possibility of overfitting" the model, as a risk that "is far too great" (p. 416). The consequence is that "the results" may have "anything but the most tentative interpretation" (p. 416). On the other hand, Babyak discusses how, of all the stepwise approaches, the least harmful of the approaches is likely backward selection when using the very liberal p value criterion of .05. Babyak considers "the inclusion of true predictors via the liberal entry criterion," but asserts that it ultimately "outweighs the problem of including unimportant variables" (p. 416). Still, with such a small sample size and using the backward stepwise selection procedure, the findings of this study will at best be considered suggestive.

Controlling for social desirability, backwards stepwise regression showed **(1) a higher asthma knowledge (on the TAKT-40),** was significantly predicted by:

- ***Higher*** *annual household income (B= .449, P=.015)*
- ***Lower*** *number of children (B=-1.014, P=.001)*
  Greater extent of negative impacts *from asthma on child, parent, and family (B=.921, P=.004)*
- For the model 30.0% of the variance was predicted (R^2= 0.346, adjusted R^2= 0.300).

See Table 12.

Table 12. *Backwards Stepwise Regression Predicting Asthma Knowledge on the TAKT-40*

Variables	B	SE of B	P
Higher Annual Household Income	.449	.280	0.015
Lower Number of Children	-1.014	-.373	.001
Greater extent of negative impacts from asthma on child, parent, and family	.921	.323	.004

F=7.525 (p=.000)
R^2 (0.346), Adjusted R^2 (0.300) – meaning 30.0% of variance was explained by this model.

While controlling for social desirability, a second backward stepwise regression sought to identify the significant predictors of **(2) a higher asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors.** The regression began with a pool of 11 independent variables of interest. The following dichotomous variables were selected for inclusion in the model: ethnicity white—yes/no; partner—yes/no; employed—yes/no; parental atopy of asthma/biological father or mother has history of asthma—yes/no. The following continuous variables were selected for inclusion in the model: participant age; annual household income; participant education; number of children; extent of negative impacts from asthma on child, parent, and family; more barriers to child's health care; and extent of exposure to environmental asthma triggers.

The process described for the first regression was followed, while the same risks and limitations remained relevant, as discussed above.

While controlling for social desirability, the results of the backwards stepwise regression found **(2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors** was significantly predicted by:

- ***Fewer Barriers*** *to Child's Health Care (B= - .049, p=0.023)*
- For this model 60.0% of variance was predicted (R^2= 0.91, adjusted R^2= 0.60).

See Table 13.

Table 13. *Backwards Stepwise Regression Predicting Asthma Self-Efficacy*

Variables	B	SE of B	P
Fewer Barriers to Child's Health Care	-.049	-.305	0.023

F=2.957 (p=.060)
R^2 (0.91), Adjusted R^2 (0.60) – meaning 60.0% of variance was explained by this model.

Qualitative Portion of Study

Results for Research Question #18

> *What were the emergent themes from an analysis of qualitative data in response to open-ended questions—regarding: (1) the most difficult and stressful parts of caring for their child with asthma and helping them achieve asthma control; and (2) their best coping strategies, or most successful strategies, or best ways for helping their child achieve asthma control, and anything they discovered and can share so other mothers/families can better help their child achieve asthma control?*

Part XI: Open Ended Questions on Asthma-Related Stress and Coping Strategies (OEQ-OARS-ACS-2). Two questions provided qualitative data for analysis.

A-Most Difficult and Stressful Aspects of Caring for a Child with Asthma. For (a) *the most difficult and stressful parts of caring for child with asthma or, the most difficult and stressful aspects of helping child achieve asthma control*, the **15 emergent themes that were within six categories** are shown, along with selected quotes, below:

Category I- Fear of Imminent Asthma Attack

2 Emergent Themes: 1-Managing Child's Fears and Concerns; 2-Managing Own Fears and Concerns

Selected Quotes:

- "I find the most stressful part was the worry involved in night asthma attacks."
- "The most stressful part has been not knowing when my child will have an asthma attack."
- "The most stressful parts of caring for my child with asthma has been the sudden attacks and ER visits before his diagnosis."
- "I worry that she won't be able to breathe."
- "I also suffer from PTSD from it. She went completely limp in my arms as I carried her to the car, and started vomiting while passed out... crying thinking about it."
- "He is so scared of any hospital setting… He's very fearful of doctors and nurses he's been hospitalized in the past so many times so that's is why he is scared."
- "I remember our daughter asking us if she was going to die when she was on HDU in hospital."
- "My child is sometimes embarrassed by the attention when using her medication during a strenuous physical activity."

- "The most difficult part is when my son's asthma keeps him from playing, petting animals, and getting a good night sleep."
- "The most difficult part of having a child with asthma is how it affects him when he gets sick."

Category II-Coping with Comorbidities

3 Emergent Themes: 1-Managing needs of child with asthma and another chronic condition (such as autism); 2-Managing needs of child with asthma and an acute condition (such as a cold or flu); 3-Balancing child with asthma and other child(ren)'s medical needs

Selected Quotes:

- "Asthma usually doesn't come on it's own. Eczema, allergies - it's all a big package to handle for the whole family"
- "Any time he gets the slightest stuffy nose or cold I brace myself for sleepless nights and visits to urgent care."
- "My child has a combination of factors that contribute to his asthma including reflux and what we suspect is maybe some kind of vocal cord dysfunction so we need to control those issues as well so that they don't trigger the asthma"
- "Cold weather effects my daughters asthma – gives her a nasty chesty cough which ends up with her being prescribed steroids and then if that doesn't clear up she is admitted to hospital."
- "When she gets a cold we know she will experience asthma and we cannot avoid it."
- "He also has breath holding syndrome which was unintentional and would stop breathing and black out and I was afraid it would send him into a flare."
- "It was also hard to know when my son needed it as he also has autism and when he was little he wasn't always able to indicate when he couldn't breath."

Category III: Coping with Financial Costs and Access to Medical Care and/or Prescriptions

4 Emergent Themes: 1-Cost of Prescriptions; 2-Cost of Medical Care; 3-Issues Regarding Medical Insurance; 4-Issues Regarding Access to Healthcare Professionals

Selected Quotes:

- "My son's asthma is currently not under control and it is very difficult to access a consultant"
- "Waiting for appointments with pulmonologist after the first hospitalization"
- "getting medical help"
- "Having a doctor actually listen"
- "Cost of prescriptions"
- "Dealing with insurance that doesn't want to pay for anything"

- "finances played a huge role as our insurance didn't always cover meds, full hospital stays, etc."

Category IV-Educating Other Adults and Advocating for Child's Needs

2 Emergent Themes: 1- Educating Child's Teachers/School Staff; **2-** Educating Other Adults in the Child's Life

Selected Quotes:

- "Conveying to education workers his visual signs of distress and them giving rescue inhaler appropriately."
- "Getting all the adults in his life on the same page about his asthma medication and care."
- "Getting other family members to participate in supporting the care."
- "I have had to switch schools due to his asthma."
- "Making sure they are given their inhalers at school when they need it is stressful."

Category V-Ensuring Medication Adherence

2 Emergent Themes: 1-Purposeful Non-adherence; 2-Accidental Non-Adherence

Selected Quotes:

- "remembering all the medication (2 for asthma and 2 others for another condition)"
- "The most stressful parts about dealing with a child with asthma is getting them to take their medication everyday"
- "When she gets unexpected attacks and we barely have medication"

Category VI-Identification of Triggers

2 Themes: 1-Locating Triggers of Asthma Symptoms: 2- Working with Doctor to identify Triggers

Selected Quotes:

- "Narrowing down triggers was the most stressful part for us."
- "Not knowing what triggered it."
- "The most difficult or stressful part to achieve asthma control with my child was not knowing what he was allergic to since it was unclear to the doctor."

See Table 14.

Table 14. *Most Difficult and Stressful Aspects of Caring for a Child with Asthma* (N=62)

Six Categories for 15 Emergent Themes

Category I- Fear of Imminent Asthma Attack
- **2 Emergent Themes:**
- 1-Managing Child's Fears and Concerns
- 2-Managing Own Fears and Concerns

Category II-Coping with Comorbidities
- **3 Emergent Themes:**
- 1-Managing needs of child with asthma and another chronic condition (such as autism)
- 2-Managing needs of child with asthma and an acute condition (such as a cold or flu)
- 3-Balancing child with asthma and other child(ren)'s medical needs

Category III: Coping with Financial Costs and Access to Medical Care and/or Prescriptions
- **4 Emergent Themes:**
- 1-Cost of Prescriptions
- 2-Cost of Medical Care
- 3-Issues Regarding Medical Insurance
- 4-Issues Regarding Access to Healthcare Professionals

Category IV-Educating Other Adults and Advocating for Child's Needs
- **2 Emergent Themes:**
- 1-Educating Child's Teachers/School Staff
- **2-**Educating Other Adults in the Child's Life

Category V-Ensuring Medication Adherence
- **2 Emergent Themes:**
- 1-Purposeful Non-adherence
- 2-Accidental Non-Adherence

Category VI-Identification of Triggers
- **2 Themes:**
- 1-Locating Triggers of Asthma Symptoms
- 2-Working with Doctor to identify Triggers

B-Mothers' Most Successful Coping Strategies for Childhood Asthma and Recommendations to Other Mothers. For question (b) requesting, "their best coping strategies, or most successful strategies, or best ways for helping their child achieve *asthma control*, and anything they discovered and can share so other mothers/families

can better help their child achieve *asthma control"*—the following 11 emergent themes within four categories with selected quotes were identified:

Category I-Essential Need for Education, Communication, and Support

Emergent Themes: 1-Speaking with Others for Information, Social Support, and Continuity of Care; 2-Self-Educating About Asthma; 3-Using Medical Information and Resources

Selected Quotes:

- "I think having support of other parents who also deal with asthma is good and having a provider be on hand to call when needed to reassure parents when unsure."
- "really educating yourself about asthma."
- "Education. Using the resources left in the doctors office and doing my own research."
- By understanding what other's go through like me."
- "I think an open line of communication, an excellent medical team, and education are the key factors in helping achieve asthma control.
- "talking to my child's doctor about any of my concerns."
- "The strategies that worked were being in strong connection with our son's school nurse"
- "STAY ON TOP OF HEALTHCARE PROVIDERS to make a plan, demand continuity of care."
- "I read a lot online and case studies of other families. Instagram is very good to see how others cope and their stories"
- "I'm in support groups and research on numerous asthma breakthroughs"
- "Keep reading"
- "I've spent countless hours researching best practices for younger children, and to find out how we can set our child up for the healthiest future possible."
- "Staying educated about asthma"
- "Talk to other parents so I don't feel alone and can get support."
- "I also downloaded allergy apps that send me an email to let me know what is high in the air."

Category II-Eliminating, Avoiding and Managing Exposure to Triggers

Emergent Themes: 1- Removing Allergens and/or Triggers Inside of the Home; 2- Avoiding Allergens and/or Triggers Outside of the Home

Selected Quotes:

- "keeping her away from allergens."
- "Unfortunately avoiding fun things like bonfires or heavily chlorinated pools, petting animals...avoiding the triggers."

- “finding them calm activities that don’t get them too worked up are very helpful.”
- “keeping triggers away as much as possible”
- “Limit or eliminate dairy.”
- “Making sure I stay on top of dusting and making sure he doesn't get sick from the common cold.”
- “Removing allergens from the sleeping environment (pets not allowed on the floor with bedrooms, hot washing bedding, limit stuffed animals, frequent vacuuming).”
- “The best coping strategies are to avoid people that smoke”
- “To know her limits and to go take time to breathe and relax”
- “Avoid your child doing too much activity if it's too hot or too cold outside.”

Category III-Following Medical Advice and Instructions for Good Adherence

Emergent Themes: 1-Adherence to Medications; 2-Following the Asthma Plan; 3-Creating Routines and Using Reminders

Selected Quotes:

- “Best coping strategies is following the pediatricians directions.”
- “Follow the asthma plan!”
- “Charting compliance with meds being taken.”
- “follow the dr prescribed regiment.”
- “Following his medication plan everyday and communication with health care workers”
- “Having him take his medication as a part of his daily routine, so it's rarely missed.”
- “Making sure she doesn't miss her inhaler corticosteroids and other medications”
- “medication routine, morning and night”
- “Using long term bronchodilator consistently”
- “We set alarms to make sure he takes his preventer medication consistently and log every time he needs to take his rescue medication”
- “When the seasons change have an emergency plan in action.”

Category IV-Ensuring Early Recognition of Symptoms of Asthma

Emergent Themes: 1-Understanding Child’s Articulation of Asthma Symptoms; 2- Independently Recognizing Child’s Symptoms: 3-Teaching Others to Recognize Child’s Symptoms

Selected Quotes:

- “After understanding his asthma, I was better able to catch the signs before a serious attack. Before he was diagnosed, my son at the age of 3, complained his stomach was "hurting" but in reality

he was having a hard time breathing. It was his lungs tightening, that was hurting."

- "Noticing the signs early / being aware of changes in my child's breathing"
- "always making sure your child fully understands their own symptoms."
- "We talk about his triggers, his medications and symptoms together"

See Table 15.

Table 15. *Mothers' Most Successful Coping Strategies for Childhood Asthma and Recommendations to Other Mothers* (N=62)

Four Categories for 11 Emergent Themes
Category I-Essential Need for Education, Communication, and Support
Emergent Themes:
1-Speaking with Others for Information, Social Support, and Continuity of Care
2-Self-Educating About Asthma
3-Using Medical Information and Resources
Category II-Eliminating, Avoiding and Managing Exposure to Triggers
Emergent Themes:
1-Removing Allergens and/or Triggers Inside of the Home
2-Avoiding Allergens and/or Triggers Outside of the Home
Category III-Following Medical Advice and Instructions for Good Adherence
Emergent Themes:
1-Adherence to Medications
2-Following the Asthma Plan
3-Creating Routines and Using Reminders
Category IV-Ensuring Early Recognition of Symptoms of Asthma
Emergent Themes:
1-Understanding Child's Articulation of Asthma Symptoms
2- Independently Recognizing Child's Symptoms
3-Teaching Others to Recognize Child's Symptoms

Conclusion

In this chapter, the results of the data analysis were presented in order of the research questions. First, the quantitative results of the study were presented and summarized, including the use of tables for data organization. Then, the qualitative results were presented with emergent themes, including tables.

The next Chapter, V, presents a summary of the study, including a discussion of relevant results, as well as implications and recommendations for future research that arise from the study findings.

Chapter V

SUMMARY, DISCUSSION, IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSION

This chapter will offer a summary and a discussion of the dissertation research. This chapter will also present the implications of the findings of the research, as well as recommendations for future research studies. Finally, this chapter will discuss the limitations of this research and will present a final conclusion.

Summary of the Literature Review

It is well-established that asthma is "the most common chronic childhood disease in childhood"—while associated with a decreased quality of life, as well as many direct and indirect "societal costs" (Pape et al., 2021). Contemporary research prioritizes a focus on factors that may be contributing to the public health concern of childhood asthma (Khreis, et al., 2021; Kuang et al., 2021; Kulikova et al., 2021; Panisch et al., 2021; Saragondlu Lakshminarasappa et al., 2021)—as well as racial disparities in the prevalence of asthma, which disproportionately impacts African American children compared to White children in the United States (Alwan, 2021).

Globally, asthma impacts anywhere from 3% to 35% of the world's population, and 300 million people are estimated to suffer from the chronic pulmonary disease of asthma (Zarei et al., 2020). Thus, it is for good reason that childhood asthma remains an important contemporary focus for researchers (e.g., Akar-Ghibril et al., 2020; Kothalawala et al., 2020; Lebold et al., 2020; To et al., 2020).

The burden of the disease of asthma is vast, as 6.1 million children under 18 years of age were found to collectively have missed 10.5 million school days per year (Woodley, 2019, p. 191). Asthma-related expenses are substantial, totaling $80 billion per year in economic costs; this includes "provider office visits, ED visits, inpatient hospital stays, mortality, and school and work absenteeism" (p. 191). It can be "stressful for parents when their children experience asthma exacerbations, and parental anxiety often ensues" (p. 192).

Orihara et al. (2010) characterized asthma as a chronic condition with a complex etiology and even more complex associated symptoms that are the result of environmental irritants, or triggers. Asthma includes underlying airway inflammation, smooth muscle hyperresponsiveness, and immunological reactions (p. 605). Due to the complex nature of asthma, "advances in therapeutic discoveries and developments have been limited" (p. 605). In turn, the precise roles of individuals suffering from asthma and their caregivers in the management of asthma symptoms present new challenges (p. 605).

Hammelmann et al. (2020) emphasized the importance of achieving *asthma control*, citing "the potential for asthma attacks, adverse effects of medications, and progression of the disease" (p. 233). These are contributing factors of "growing concern regarding the long-term outcomes in many cases of early and poorly controlled childhood asthma" (p. 234). Long-term negative health outcomes include but are not limited to "progression to severe asthma, irrecoverable loss of lung function, and chronic pulmonary disease (COPD) in later life" (p. 234). Asthma control is achieved through behaviors that "reduce asthma attacks, and prevent long-term adverse outcomes of childhood asthma" (p. 234). Maternal behaviors, such as "maternal smoking and second-

hand tobacco smoke exposure" not only may negatively affect lung function, but "strong harmful effects have been reported in children" (p. 234).

Asthma control can often be achieved via "health promotion measures, self-monitoring and self-care, taking bronchodilators as soon as symptoms start," and "taking other maintenance medications on a regular and timely basis" (Woodley, 2019, p. 194). Avoidance measures, such as circumventing "triggers that can precipitate an attack" are also encouraged (p. 194).

Mansour et al. (2000) also acknowledged the potential role of environmental factors that may negatively impact the goal of achieving asthma control. They included environmental factors "such as geographic location, transportation, and increased exposure to certain allergens" which "may also function as barriers to good health outcomes" (p. 512). Also cited was a parents' inability "to limit exposure to environmental triggers" which might be "related to financial constraints or affordable housing" (p. 512). Mansour et al. discussed how families "from impoverished backgrounds may be less likely to have family or community support for the asthma management of their children"—while being unable to escape the influence of environmental factors (p. 512).

Kulikova et al. (2021) noted the relationship between pediatric asthma and anxiety and depression, which can exacerbate asthma symptoms, while further diminishing the quality of life. Kaas et al. (2021) also acknowledged how a body of literature established the association between childhood asthma and the risk of also presenting anxiety and depression, while finding an association between childhood asthma and attention-deficit hyperactivity disorder (ADHD). Pape et al. (2021) also

acknowledged how Adverse Childhood Experiences (ACEs) have been linked to the development of asthma in children.

Greenlee et al. (2019) discussed how children with asthma "are at increased risk for myriad challenges including mental health concerns and impaired quality of life" (p. 270). The importance of the parent-child dyad in asthma management cannot be emphasized enough, as "understanding family based factors associated with" the potential "negative outcomes for children with asthma is critical" within the process of developing and implementing "effective prevention and intervention efforts" (p. 270).

Among children at risk, "maternal and paternal asthma are also associated with adverse long-term outcomes" (Hammelmann et al., 2019, p. 235). Lebold et al. (2020) indicated that "parental asthma and atopy are clearly linked to the development of asthma in children" (p. 113).

According to Champion and Skinner (2008), perceived barriers to health-related behavior change may involve a "nonconscious, cost-benefit analysis" during which time "individuals weigh the action's expected benefits with perceived barriers" (p. 47). Across health behavior model studies, "perceived barriers were the most powerful single predictor" of change (p. 50).

Research on intervention to improve asthma control and asthma management have confirmed an important role for nurses (e.g., Isik et al., 2020), practitioners (e.g., Foster et al., 2014), and novel online webinar education formats for caregivers (e.g., Sawicki & White, 2020). Also, noteworthy, is the value found for the specific online genre of e-health using knowledge tests with all true answers (e.g., Afram, 2019; Aiyedun, 2014). Researchers have found that both an increase in asthma knowledge and self-efficacy were associated with exposure to a multimedia

training on asthma (Zarei et al., 2020). It is, therefore, appropriate to investigate not only asthma knowledge, but also asthma self-efficacy, as did Zarei et al.

Following Zarei et al. (2020), there is a justification for research in the field of asthma being rooted in self-efficacy theory. Other research studies that also involved a focus on delivering brief online e-health (i.e., Afram, 2019; Aiyedun, 2014) were grounded in self-efficacy theory (Bandura, 1977), as well as the diffusion of innovations theory (Rogers, 1995). Hence, the present study will be grounded in self-efficacy theory (Bandura, 1977) and the diffusion of innovations theory (Rogers, 1995).

Summary of the Statement of the Problem

The problem that this study addresses is the "increasingly felt" need for "educational media" and "innovative methods to improve asthma care" (Zarei et al., 2020, p. 1135).

Summary of the Purpose of the Study

The present study seeks to address the problem of an increasingly felt need by health professionals for innovative educational media to improve the management of asthma in children by:

> (1) having created new educational media in the form of a **new brief e-health online knowledge test intervention (i.e., The Asthma Knowledge Test, or TAKT-40)**—with all true answers;
>
> (2) **evaluating the new brief e-health online knowledge test intervention** (i.e., **The Asthma Knowledge Test, or TAKT-40)** via an online investigation with a convenience sample of mothers (N=62) of children (ages 6 to 14) diagnosed with asthma; and,
>
> (3) identifying the significant predictors of the investigation's **two outcome variables** of

(a) mothers' **asthma knowledge** (as measured by the new TAKT-40, as a true-false knowledge test with all true answers) and
(b) mother's **asthma self-efficacy to manage childhood asthma**

Summary of the Research Questions

Given a sample of mothers (N=62) of children age 6 to 14 who have been diagnosed with asthma and respond to a social media campaign using a core message on various online platforms (i.e., **"CLICK ON: https://tinyurl.com/Asthma-Survey-for-Mothers - And take the Survey for Mothers of a Child Age 6-14 with Asthma (Takes 15-20 Minutes) for a chance to win one of three $100 Amazon gift cards."**), this study sought the following:

1-using descriptive statistics, determine the characteristics of mothers of children with asthma, as well as their children's background information, and potential factors playing a role in asthma control and asthma management (e.g., asthma impact on children, parents, and families; barriers; exposure to environmental triggers for asthma)

2-using inferential statistics (i.e., Independent t-tests, Pearson Correlations, the relationship of selected independent variables (e.g., age, income, education, survey parts) with the **two study outcome variables of (1) a high asthma knowledge (on the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors for asthma control (**i.e., **1-** taking care of my child with asthma, and helping my child achieve *asthma control*; **2-** talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, **3-** talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma).

3-using backward stepwise regression, controlling for social desirability, identify the significant predictors of the **two study outcome variables of (1) a high asthma knowledge (on**

the TAKT-40), and (2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors for asthma control.

4-engaging in qualitative data analysis to identify emergent themes and categories from mother's open-ended responses to two prompts (i.e., 1- the most difficult and stressful parts of caring for their child with asthma and helping them achieve asthma control; and, 2-their best coping strategies, or most successful strategies, or best ways for helping their child achieve *asthma control*, and anything they discovered and can share so other mothers/families can better help their child achieve *asthma control*).

Summary of Anticipated Findings

Favorable findings were anticipated for evaluating **The Asthma Knowledge Test for Parents (TAKT-40).** First, it was anticipated that there would be a significant difference between before/pre-test taking TAKT-40 versus after/post-test taking TAKT-40 mean scores (using paired t-tests) **for self-ratings of their** asthma knowledge—with after/post-test taking TAKT-40 mean scores being higher**.** Secondly, it was anticipated that there would be a significant difference between before/pre-test taking TAKT-40 versus after/post-test taking TAKT-40 mean scores (using paired t-tests) **for self-ratings of their** asthma self-efficacy (as a Global Mean) based on performing three key behaviors (i.e., 1- taking care of my child with asthma, and helping my child achieve *asthma control*; 2- talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma).

Further, it was anticipated that when controlling for social desirability, the higher the mothers' level of **asthma knowledge**, as measured by ***The Asthma Knowledge Test for Parents (TAKT-40),*** then the:

- higher their age; higher their level of education; higher their annual household income; child has had asthma for more years; medication adherence occurs *all the time* at primary home; medication adherence occurs *all the time* at any secondary home; asthma impact for child *missing school* occurs *rarely/never*; greater asthma impact for parent *missing work* occurs *rarely/never*; greater asthma impact *for parent/family experiencing a great deal of stress and anxiety* occurs rarely/never; lower the barriers to getting child healthcare, as recommended; history of asthma in biological mother and/or father (Yes); mother is currently taking medication to manage her own asthma (Yes); mother does not smoke in primary home; mother's partner does not smoke in primary home; lower the number of cats and dogs also living inside the home; adult responsible for child in any secondary home does not smoke; partner of the adult responsible for child in any secondary home does not smoke; the lower the exposure to potential triggers for asthma in the primary home; the lower the exposure to potential triggers for asthma in any secondary home; and, the higher their asthma self-efficacy (Global score).

Finally, it was anticipated that the higher the mother's level of **asthma self-efficacy (as a Global Mean) based on performing three key behaviors,** then the:

- higher their age; higher their level of education; higher their annual household income; child has had asthma for more years; medication adherence occurs *all the time* at primary home; medication adherence occurs *all the time* at any secondary home; greater asthma impact for child *missing school* occurs *rarely/never;* greater asthma impact for parent *missing work* occurs *rarely/never;* greater asthma impact *for parent/family experiencing a great deal of stress and anxiety* occurs rarely/never; lower the barriers to getting child healthcare, as recommended; history of asthma in biological mother and/or father (Yes); mother is currently taking medication to manage her own asthma (Yes); mother does not smoke in primary home; mother's partner does not smoke in primary home; lower the number of cats and dogs also living inside the home; adult responsible for child in any secondary home does not smoke; partner of the adult responsible for child in any secondary home does not smoke; the lower the exposure to potential triggers for asthma in the primary home; and, the lower the exposure to potential triggers for asthma in any secondary home,

Summary of the Research Sample and Procedures

This study recruited 62 Mothers of a child diagnosed with asthma aged 6-14. Mothers were recruited to this study via a social media campaign, wherein the primary study recruitment message, shown below, was widely disseminated via Twitter, LinkedIn, Reddit, Instagram, Facebook, emails, and tweets/text messages:

> **CLICK ON: https://tinyurl.com/Asthma-Survey-for-Mothers - And take the Survey for Mothers of a Child Age 6-14 with Asthma (Takes 15-20 Minutes) for a chance to win one of three $100 Amazon gift cards**

Participants had to meet study inclusion criteria by answering "yes" to key screening questions: as also shown below:

> 1-Are you a woman age 21 or older? ; 2-Are you able to read and understand English on a high school level? ; 3-Are you the parent or guardian of at least one child aged 6 to 14 diagnosed by a healthcare provider or pediatrician with ASTHMA? ; and, 4-Are you willing and able to spend about **15-20** minutes answering survey questions—about yourself, your children, the care of your child's asthma, and what you know about asthma?

Summary of the Research Instrumentation

Data were collected with the study measure: "Survey for Mothers of a Child Age 6-14 with Asthma," as a combination of some new tools, and other tools commonly used in e-health research conducted by the Research Group on Disparities in Health (RGDH), Director, Professor Barbara Wallace, Teachers College, Columbia University. The survey parts were, as follows:

- Part I: Basic Demographics (P-BD-8)
- Part II: About Their Child with Asthma (ATCWA-13)
- Part III: Barriers to Child's Health Care (C-OB-CHC-12)

- Part IV: Parental History of Asthma and Any Current Self-Management of Asthma with Medication by Mother (PHA-ACSMA-WMBM-4)
- Part V: Single Item Rating of Risk of Providing Socially Desirable Responses
- Part VI: Exposure to Environmental Asthma Triggers in Primary Home (ETEAT-IPH-16)
- Part VII: Exposure to Environmental Asthma Triggers in Secondary Home (ETAT-ISH-16)
- Part VIII: The Asthma Knowledge Test for Parents (TAKT-40)
- Part IX: Diffusion of the Innovation of the Asthma Knowledge Test for Parents (DOI-AKTFP-1)
- Part X: Pre- and Post-Knowledge Test – Ratings for Knowledge and Self-Efficacy to Manage Child's Asthma (PRE-A-POST-KT-RF-K-SE-TMCA-8)
- Part XI: Open Ended Questions on Asthma-Related Stress and Coping Strategies (OEQ-OARS-ACS-2)

Summary of Data Management and Data Analysis

Data were collected from the online surveys at www.qualtrics.com and then transferred to the latest version of SPSS that was available, SPSS version 26. Data analyses included the use of descriptive statistics to characterize the sample, the use of inferential statistics (i.e., Pearson correlation, independent t-tests) to determine relationships between the two study outcome variables and selected independent variables, and backward stepwise regression was used to **identify the significant predictors of each of the following two study outcome/dependent variables**:

(1) mothers having a high level of **asthma knowledge** (as measured by a new true-false knowledge test with all true answers); and,

(2) mothers having a high level of **asthma self-efficacy for performing 3 key behaviors for achieving asthma control** (for post-test-taking)**:** i.e., 1- taking care of my child with asthma, and helping my child achieve *asthma control*; 2- talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms; and, 3- talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma.

In considering all findings, it may be kept in mind that the sample of mothers presented a *low level of social desirability* (mean=3.39, min 0, max 11, SD=3.107).

Summary of the Results of Data Analysis

Findings Describing the Sample of Mothers and Children with Asthma

The sample (N=62) had a *mean number of children of 2.31* (min=1, max=6, SD=1.018), and a *mean age of 39.13* (min=27, max=52, SD=5.635), with 66.1% (n= 41) White, 24.2% Black, and 9.7% (n=6) Hispanic—with 88.7% living with a partner (n=55). The mean level of education was category 4.44 (min=1, max=7, SD=1.386) for *between Some College and Master's degrees*, with 61.3% of mothers employed (n=38), and a mean annual household income of *category 4.03* (SD=1.727) for *between $100,000 – $199,999*.

The *mean age for children was 9.06* (min=6, max=14, SD=2.36), with a *mean of 7.51 years since the asthma diagnosis* (min=1, max=14, SD=2.50), with 98.4% (n=61) having prescribed medication for asthma management, 80.6% (n=50) currently taking

medication—with 50.0% (n=31) taking medication as prescribed at home, and 30.6% (n=19) taking medication as prescribed when away from home. For the **extent of negative impacts from asthma on child, parent, and family**, findings showed: 90.3% had ever missed school or been absent from school due to asthma, 83.9%) of parents had ever missed work due to their child's asthma, and 98.4% of mothers and/or family members ever experienced a great deal of stress and anxiety due to managing their child's asthma. Also, mothers reported barriers to managing their child's health care with a *mean of 3.53* (min=1, max=12, SD=3.192) *for a moderate amount of barriers*—such as their work schedule (50%, n=31).

Some mothers had personal knowledge of asthma, as 93.5% (n= 58) of biological mothers had been diagnosed with asthma, while 35.5% (n=22) of fathers had been diagnosed with asthma.

For the child's primary home, 95.2% (n=59) of mothers reported their child with asthma lived with them, while 83.9% (n=52) had partners that always lived with them. Specifically, as *evidence of a generally low* **exposure to environmental triggers for the child's asthma within the primary home,** consider how:

> 91.9% (n=57) *never smoked* within the home, nor did 91.9% (n=57) of their partners—while of the mothers reporting ever having smokers in the home (n=43, 69.4%), some 24.2% (n=15) reported smokers *always go outside to smoke* and 21.0% (n=13) *never smoked inside*; 54.8% (n=34) had a cat and/or dog living in the primary home; 33.9% (n=21) lived in an urban environment and 43.5% (n=27) lived in a suburban environment—and, most (64.5%, n=40) lived in a free standing single home; 40.3%, (n=25) estimated the structure was *50 years old*, and 50.0% (n=31) rated the quality of that building structure as *very good;* 61.3% (n=38) never had a problem with pests in their home; and, 14.5% (n=9) reported living *not close at all* to routes for large trucks, while 41.9% (n=26) were *somewhat close* to routes for large trucks. While a comprehensive assessment for the child's potential exposure to environmental triggers for asthma, what is suggested is a picture of low exposure, overall. Also, of note, this body of data was dichotomized, permitting a possible high score of 7 for yes-1 and no=0 for

extent of exposure to the above potential environmental triggers for asthma in the primary home.

In addition, an 8th possible score for 1=yes and no=0 could be added to the above 7 indicators. The 8th possible score was for **any exposure to environmental triggers for asthma in the secondary home**: i.e. defined as any place the child slept at least 4 days per month.

More specifically, only 17.7% (n=11) of children lived with someone else at least 4 days out of every month, including spending the night there—qualifying as their secondary home. Hence, a body of very low frequency data in the same areas as discussed above for the primary home was substantially reduced: i.e. it was **dichotomized for yes=1 or no=0 for the presence of any exposure to environmental asthma triggers for the child in the secondary home**—for use in subsequent data analysis.

Findings Evaluating the Innovative Brief E-Health—The Asthma Knowledge Test for Parents (TAKT-40)

For the mothers' level of asthma knowledge, *the TAKT-40 mean score was 37.90* (Min=22, max=40, SD=2.768) for *high asthma knowledge*. For numerous items, 100% (N=62) currently endorsed items as True, while it was only for t where knowledge was low. Mothers had low knowledge, with 19.4% (n=12) endorsing, respectively, these items as False:

- African American children having more severe asthma symptoms
- African American children living in urban areas were more likely to need specialist providers

Another dimension for evaluating the quality of the innovative brief e-health of the TAKT-40, involved a favorable response to it. Consider how a majority of mothers

(77.4%, n=48) indicated they would recommend taking ***The Asthma Knowledge Test for Parents (TAKT-40)*** to others with a child with asthma (N=48)—thereby diffusing the innovation of learning about the management of a child's asthma via a true-false test where all items were true.

Further, **paired t-test**s were used to evaluate the impact of taking the TAKT-40. First, paired t-tests were used to compare the mothers' **self-rated asthma knowledge** for before/pre-taking the TAKT-40 (Mean=4.92, SD=.911) versus after/post-taking the TAKT-40 (Mean=5.10, SD=.824)—with **the after/post-taking TAKT-40 self-rating for asthma knowledge being higher**, **achieving significance at p < .05** (t= -2.098, df=61, p=.040).

Secondly, paired t-tests were used to further evaluate the impact of taking the TAKT-40, comparing the mothers' **self-rated self-efficacy for performing each of the three asthma management behavior**s for before/pre-taking the TAKT-40 versus after/post-taking the TAKT-40, with mixed findings. Of the three asthma management behaviors, only one showed a significant increase in mean score: i.e., for **taking care of my child with asthma, and helping my child achieve asthma control**, comparing the before/pre-taking the TAKT-40 mean (= 5.40, SD=.735) versus the after/post-taking the TAKT-40 mean (=5.53, SD=.646)—**with the after/post-taking the TAKT-40 self-rating for caring for their child <u>being higher</u>, <u>achieving significance</u> at p < .05** (t= -2.204, df=61, p=.031). There was no significant increase in mean scores from before/pre-taking the TAKT-40 versus after/post-taking the TAKT-40 for the behaviors of: **talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms**; and, for **talking to healthcare**

providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma.

Findings on Relationships Between Independent Variables and Outcome Variables

Numerous relationships were explored via Independent t-tests and Pearson correlations with the study outcomes variables, while what emerged was the following finding: significant correlations were only found between the **variable of (1) a high asthma knowledge (on the TAKT-40),** such that t**he higher the score for asthma knowledge (on the TAKT-40), then** *the **higher** the annual household income (r = 0.333, p= .008); the **higher** the level of education (r= .353, p= .005); and, the **lower** the number of children (r = -.432, p= .000).*

Also, while controlling for social desirability, backwards stepwise regression showed **(1) a higher asthma knowledge (on the TAKT-40),** was significantly predicted by: ***Higher** annual household income (B= .449, P=.015)*; ***Lower** number of children (B=-1.014, P=.001); **Greater extent of negative impacts** from asthma on child, parent, and family (B=.921, P=.004)*—30.0% of the variance predicted (R^2= 0.346, adjusted R^2= 0.300) with this model.

Secondly, while controlling for social desirability, the results of the backwards stepwise regression found **(2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors** was significantly predicted by: ***Fewer Barriers** to Child's Health Care (B= - .049, p=0.023)*—with 60.0% of variance being predicted (R^2= 0.91, adjusted R^2= 0.60).

Findings Arising from the Qualitative Data—Emergent Themes and Categories

Mothers answered two questions, providing qualitative data for analysis. For the first question prompt **for (a)** ***the most difficult and stressful parts of caring for child with asthma or, the most difficult and stressful aspects of helping child achieve asthma control*****,** qualitative data analysis gave rise to 15 emergent themes within six categories, as follows: ***Category I- Fear of Imminent Asthma Attack (2 Emergent Themes:*** *1-Managing Child's Fears and Concerns; 2-Managing Own Fears and Concerns);* ***Category II-Coping with Comorbidities (3 Emergent Themes:*** *1-Managing needs of child with asthma and another chronic condition; 2-Managing needs of child with asthma and an acute condition (cold or flu); 3-Balancing child with asthma and other child(ren)'s medical needs);* ***Category III: Coping with Financial Costs and Access to Medical Care and/or Prescriptions (4 Emergent Themes:*** *1-Cost of Prescriptions; 2-Cost of Medical Care; 3-Issues Regarding Medical Insurance;4-Issues Regarding Access to Healthcare Professionals);* ***Category IV-Educating Other Adults and Advocating for Child's Needs (2 Emergent Themes:*** *1-Educating Child's Teachers/School Staff;* ***2-****Educating Other Adults in the Child's Life****);* ***Category V-Ensuring Medication Adherence (2 Emergent Themes:*** *1-Purposeful Non-adherence; 2-Accidental Non-Adherence);* ***Category VI-Identification of Triggers (2 Themes:*** *1-Locating Triggers of Asthma Symptoms; 2-Working with Doctor to identify Triggers).*

A second question prompt (b) requested "their best coping strategies, or most successful strategies, or best ways for helping their child achieve *asthma control*, and anything they discovered and can share so other mothers/families can better help their child achieve *asthma control"*—producing the following 11 emergent themes within four

categories: ***Category I-Essential Need for Education, Communication, and Support (Emergent Themes:*** *1-Speaking with Others for Information, Social Support, and Continuity of Care****;*** *2-Self-Educating About Asthma; 3-Using Medical Information and Resources);* ***Category II-Eliminating, Avoiding and Managing Exposure to Triggers (Emergent Themes:*** *1-Removing Allergens and/or Triggers Inside of the Home****;*** *2-Avoiding Allergens and/or Triggers Outside of the Home)****; Category III-Following Medical Advice and Instructions for Good Adherence (Emergent Themes:*** *1-Adherence to Medications****;*** *2-Following the Asthma Plan****;*** *3-Creating Routines and Using Reminders;* ***Category IV-Ensuring Early Recognition of Symptoms of Asthma (Emergent Themes****: 1-Understanding Child's Articulation of Asthma Symptoms****;*** *2-Independently Recognizing Child's Symptoms****;*** *3-Teaching Others to Recognize Child's Symptoms).*

Discussion of Results

Discussion of Findings for Child's Information, as Provided by Child's Mother, and Parental History of Asthma

The sample's demographics can be compared to those in similar e-health studies, such as Hosam (2020), who evaluated a video for viewing by mother-child dyads on the child's dental healthcare. For example, in this study, the mother's age of 39.13 years was higher than the mean parent's age of 35.2 years reported by Hosam. The mean child's age of 9.06 in this study was higher than the mean child's age of 6.72 reported by Hosam. In this study, African Americans constituted 24.2%, which is higher than the 9.3% of African American mothers in the Hosam sample. The present sample had a mean household income of $50,000 to $59,999, which *was* higher than the mean annual

household income ranges of $20,000-$39,999 reported by Hosam, and the $40,000-$49,999 income range reported by Afram (2019)—in a study evaluating a prostate knowledge true-false test (with all true answers) with a sample of African-American men.

Agusala et al. (2018) discussed how school absences due to asthma "have been shown to have many adverse effects on children including a decrease in academic performance as well as mental and social hindrances" (p. 3173). This study adds to the literature on **negative impacts from asthma on child, parent, and family**, findings showed: 90.3% had ever missed school or been absent from school due to asthma, and 83.9%) of parents had ever missed work due to their child's asthma. This is consistent with the work of Fagnano et al. (2011), documenting how sleep disturbances from nocturnal asthma "may contribute significantly" to the disease burden that *extends to the whole family*— "parents of children with frequent nocturnal symptoms" being more likely "to miss work which may result in lost wages" (p. 6). In the present study, 98.4% of mothers and/or family members had experienced a great deal of stress and anxiety due to managing their child's asthma. This confirms the work of Woodley (2019) emphasized how it may be "stressful for parents when their children experience asthma exacerbations, and parental anxiety often ensues" (p. 192). Thus, "the burden of asthma extends to the child's family as well" (p. 191)—as also found in the present study.

The qualitative data on the most stressful aspects of managing their child's asthma further supported the concept of the burden of asthma including the child's experiences, while also extending to the parent and family, as the following emergent themes suggest: *Managing Child's Fears and Concerns*; and, *Managing Own Fears and Concerns.*

Across health behavior model studies, “perceived barriers were the most powerful single predictor” of change (Champion & Skinner, 2008, p. 50). Notably, Sato et al. (2013) emphasized the role of various barriers that may impact family asthma management, whereas the present study found that mothers reported *a moderate amount of barriers*—such as their work schedule (50%, n=31). The qualitative data identified yet other stressful barriers via emergent themes, as follows: *Cost of Prescriptions; Cost of Medical Care; Issues Regarding Medical Insurance; Issues Regarding Access to Healthcare Professionals; Purposeful Non-adherence;* and, *Accidental Non-Adherence.*

Other research has documented how, among children at risk, “maternal and paternal asthma are also associated with adverse long-term outcomes” (Hammelmann et al., 2019, p. 235). Hence, most relevant is how in the present study, 93.5% (n= 58) of biological mothers had been diagnosed with asthma, while 35.5% (n=22) of fathers had been diagnosed with asthma. Underscoring the relevance of this finding, Lebold et al. (2020) had indicated that “parental asthma and atopy are clearly linked to the development of asthma in children” (p. 113).

There was *evidence of a generally low* **exposure to environmental triggers for the child’s asthma within the primary home, given** how 91.9% (n=57) *never smoked* within the home, nor did 91.9% (n=57) of their partners; and, of the mothers reporting ever having smokers in the home (n=43, 69.4%), some 24.2% (n=15) reported smokers *always go outside to smoke* and 21.0% (n=13) *never smoked inside.* Several emergent themes from the qualitative data come to mind*:* i.e., *Educating Other Adults in the Child’s Life; Removing Allergens and/or Triggers Inside of the Home; Independently Recognizing Child’s Symptoms;* and, *Teaching Others to Recognize Child’s Symptoms.*

The finding on smokers not smoking in the house, and going outside to smoke was important, since avoidance measures, such as circumventing "triggers that can precipitate an attack" are encouraged (Woodley, 2019, p. 194). Specifically, "maternal smoking and second-hand tobacco smoke exposure" not only may negatively affect lung function, but "strong harmful effects have been reported in children" (Hammelmann et al., 2020, p. 234). Mother's awareness of the importance of avoiding environmental triggers for asthma was also found in emergent themes: *Locating Triggers of Asthma Symptoms*; and, *Working with Doctor to Identify Triggers.*

Other evidence of low exposure to environmental triggers for asthma were found in data showing that only 33.9% (n=21) lived in an urban environment. Mansour et al. (2000) noted how children from urban, minority, and low-income backgrounds have a much higher prevalence of asthma. Also, negative influences on asthma outcomes include "building structures and their state of repair, neighborhood infrastructures of roads," such as residing "in buildings in disrepair" with exposure to "higher levels of allergens, such as mold, dust, cockroaches, and rodents" (Woodley, 2019, p. 192). Of note, 50.0% (n=31) of mothers in the present study rated the quality of their home building structure as *very good,* while 61.3% (n=38) never had a problem with pests in their home. Also, significant is the finding in the present study that 14.5% (n=9) reported living *not close at all* to routes for large trucks, and 41.9% (n=26) were *somewhat close* to routes for large trucks. Consider this finding in light of prior research on how chronic exposure to major highways has been associated with an "increased risk of respiratory infections and asthma development in children"—as "proximity to traffic at both their homes and schools" plays a key role in asthma outcomes: and, such proximity to major

roadways is significantly associated with "increased asthma symptom days, health care utilization and poor asthma control" (Hauptman et al., 2019, p. 14). To the extent possible, family housing location was reminiscent of another emergent theme from the qualitative data: *Avoiding Allergens and/or Triggers Outside of the Home*.

Discussion of Findings Evaluating the Innovative Brief E-Health—The Asthma Knowledge Test for Parents (TAKT-40)

In the present study, the mothers' level of asthma knowledge, *the TAKT-40 mean score was 37.90* (Min=22, max=40, SD=2.768) for *high asthma knowledge*. As another study that created a true-false knowledge test with all true answers, yet for prostate knowledge and knowledge of Vitamin D supplementation, Afram's (2019) findings are comparable. Afram (2019) found a **prostate cancer and Vitamin D supplementation mean knowledge score of 25.84** (Min=0, Max=37, SD=9.50), or **moderately high knowledge.**

In the present study, 77.4% of mothers indicated that they would recommend taking ***The Asthma Knowledge Test for Parents (TAKT-40)*** to others with a child with asthma (N=48). This is an optimal outcome and in support of Rogers' (1995) diffusion of innovation theory. However, this outcome may be compared to Afram (2019) where an even greater majority, or 90.2% (n=175), indicated they would recommend the *Prostate Cancer Knowledge Test (PC-S-KT)* to other African American men as an online intervention. The intent of mothers to recommend the TAKT-40 to other mothers of children with asthma brought several emergent themes from the qualitative data to mind: i.e. *Speaking with Others for Information, Social Support, and Continuity of Care*; *Self-Educating About Asthma*; *Using Medical Information and Resources;* and, *Independently Recognizing Child's Symptoms.*

Following the methodology of Afram (2019), participants were also asked to provide self-ratings of their **knowledge** and **self-efficacy** in the present study, after completing the brief online intervention of a knowledge test. In Afram, first, for **self-rating of knowledge of prostate cancer and screening**, the *pre-knowledge test mean was 3.50* (N=194, SD=1.393) versus the *post-knowledge test mean of 4.34 (N=194, SD=1.100)*, as a difference that was statistically significant (*t*=-8.475, df=193, p=.000)—suggesting knowledge was self-rated as higher, after taking the knowledge test. In the present study, similarly, paired t-tests were used to compare the mothers' **self-rated asthma knowledge** for before/pre-taking the TAKT-40 (Mean=4.92, SD=.911) versus after/post-taking the TAKT-40 (Mean=5.10, SD=.824)—with **the after/post-taking TAKT-40 self-rating for asthma knowledge being higher**, **achieving significance at p < .05** (t= -2.098, df=61, p=.040). Thus, both of the studies suggest that taking a knowledge test with all true answers may serve as an effective brief online e-health intervention, that demonstrates self-ratings of higher knowledge after the experience of taking the knowledge test.

Both the present study and the Afram (2019) also sought to determine if taking such a knowledge test with all true answers might impact self-efficacy for performing behaviors relevant to the topic of focus. Afram found: 1-for **self-efficacy for talking to doctor about prostate cancer and screening**, the *pre-knowledge test mean was 4.19* (N=194, SD=1.544) versus the *post-knowledge test mean of 5.17 (N=194, SD=.942)*, as a difference that was statistically significant (*t*=-9.098, df=193, p=.000); and, for **self-efficacy for talking about Vitamin D screening and supplementation**, the *pre-knowledge test mean was 4.05* (N=192, SD=1.627) versus the *post-knowledge test mean*

of 5.14 (N=192, SD=.985), as a difference that was statistically significant (*t*=-9.384, df=193, p=.000). The present study examined three behaviors relevant to asthma management, finding that just one of the three behaviors involved a significant finding for self-efficacy: i.e. for self-efficacy for **taking care of my child with asthma, and helping my child achieve asthma control**, comparing the before/pre-taking the TAKT-40 mean (= 5.40, SD=.735) versus the after/post-taking the TAKT-40 mean (=5.53, SD=.646)—**with the after/post-taking the TAKT-40 self-rating for self-efficacy for caring for their child being higher, achieving significance at p < .05** (t= -2.204, df=61, p=.031). There was no significant increase in mean scores from before/pre-taking the TAKT-40 versus after/post-taking the TAKT-40 for self-efficacy for performing the behaviors of: **talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms**; and, for **talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma.**

Both the Afram (2019) and present study suggest that the brief online e-health intervention of taking a knowledge test can also positively impact self-efficacy for performing behaviors relevant to the content of the knowledge test. Findings in the present study are reminiscent of the statement made by Al-Zalabani and Almotairy (2020) that "increased knowledge toward asthma results in a better control" (p. 738).

Discussion of Findings on Relationships Between Independent Variables and Outcome Variables

Regarding noteworthy relationships among independent variables and the study outcome variables, significant correlations were only found between the **variable of (1) a high asthma knowledge (on the TAKT-40),** such that t**he higher the score for asthma**

knowledge (on the TAKT-40), then *the **higher** the annual household income (r= 0.333, p= .008); the **highe**r the level of education (r= .353, p= .005); and, the **lower** the number of children (r = -.432, p= .000).* In particular, the finding that the higher the asthma knowledge, the lower number of children the mother reports having is similar to findings by Al-Zalabsni and Almotairy (2020); they found that when a family has 2 children with asthma, then the asthma was less likely to be controlled in comparison to families with one child with asthma (p. 737). Of note, the finding of the impact of number of children on asthma management was found in an emergent theme from the analysis of qualitative data: i.e. *Balancing child with asthma and other child(ren)'s medical needs).*

An association between number of children in the family and higher asthma knowledge was also found in the present study's regression. In the backwards stepwise regression, when controlling for social desirability, the significant predictors of **(1) a higher asthma knowledge (on the TAKT-40) were**: ***Higher** annual household income (B= .449, P=.015)*; ***Lower** number of children (B=-1.014, P=.001); **Greater extent of negative impacts** from asthma on child, parent, and family (B=.921, P=.004)*—30.0% of the variance predicted (R^2= 0.346, adjusted R^2= 0.300) with this model. Future research may need to explore other variables to account for greater variance, such as including factors such as their social support networks and sources of information used for gaining knowledge about asthma.

Secondly, while controlling for social desirability, the results of the backwards stepwise regression found **(2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors** was significantly predicted by: ***Fewer Barriers** to Child's Health Care (B= - .049, p=0.023)*—with 60.0% of variance was predicted

(R^2= 0.91, adjusted R^2= 0.60). This is a substantial amount of variance accounting for asthma self-efficacy, while future research might include additional measures targeting other dimensions of self-efficacy, such as self-efficacy for problem solving.

Implications for Practice and Recommendations for Research

This cross-sectional mixed-method study with a small sample (n=62) of mothers of children with asthma is more of a pilot of a brief online e-health intervention of **The Asthma Knowledge Test for Parents (TAKT-40)** with all true answers that was highly recommended (77.4%) by mothers to other parents with children with asthma. Suggestive of the TAKT-40 being a potential brief online intervention of value in the future, paired t-tests were suggestive in this pilot, showing:

1-mother's self-ratings for their level of knowledge were **higher after** they had taken the TAKT-40 with all true answers when compared to their self-ratings of their knowledge before they had taken the TAKT-40, **achieving significance at just p < .05** (before/pre= Mean=4.92, SD=.911; after/post- Mean=5.10, SD=.824; t= -2.098, df=61, p=.040).

2- among the three behaviors for asthma management for which the mother's self-efficacy was assessed, it was only for one of these three behaviors that self-efficacy increased after taking the TAKT-40 with all true answers: i.e., specifically, ratings of their self-efficacy for taking care of their child with asthma and helping their child achieve asthma control were **higher after** they had taken the TAKT-40 when compared to self-ratings of self-efficacy before they had taken the TAKT-40, **achieving significance at just p < .05** (before/pre- Mean= 5.40, SD=.735; after/post- Mean =5.53, SD=.646; t= -2.204, df=61, p=.031).

These pilot findings are sufficiently suggestive to have several implications, given the recommendations of the mothers to diffuse the TAKT-40 as an innovation for learning about caring for one's child with asthma so as to improve asthma control and asthma management. Diffusion of the innovation is justified, given this study's evaluation of the new brief e-health intervention of The Asthma Knowledge Test for Parents (TAKT-40). **Consider the following implications for practice and recommendations for future research.**

- The TAKT-40 should be disseminated online so parents—seeking information or sharing information on asthma, or providing support among parents with asthma, or wanting to educate any others who may be in contact with their child with asthma—can readily access it and further disseminate it. This implication for wide dissemination also follows from multiple emergent themes: *Educating Other Adults in the Child's Life; Teaching Others to Recognize Child's Symptoms; Speaking with Others for Information, Social Support, and Continuity of Care*; *Self-Educating About Asthma*; *Using Medical Information and Resources;* and, *Independently Recognizing Child's Symptoms.* The new TAKT40 can play a role in mother's lives, as they seek a brief online e-health source that is related to all of these themes, which they can easily access and widely share.
- Providers can easily share the link to the TAKT-40 online, including providing the link via email or in the chat during telehealth sessions with mothers and children—during the COVID-19 pandemic; and, post-pandemic

providers can continue to share the link to the TAKT-40 and display the TAKT-40 on large screens in their waiting-room areas.

- Post-pandemic, the TAKT-40 questions and answers could also be projected on large screens in emergency rooms—to reach the general public, and still have a substantial impact, given the high prevalence of asthma.
- Hospital and medical systems can seek to use the TAKT-40 to improve their service-delivery, assess patient/parent knowledge, and conduct research on impact of services on patient outcomes.
- Using the present pilot study findings, the TAKT-40 and related tools for evaluation could be used in a much larger study with a nationally representative sample, and a much more diverse sample, as the present sample was not diverse (66.1% White, 24.2% Black, and 9.7% Hispanic).
    - This studies' other Pre- and Post- measures of knowledge and self-efficacy could be used as part of the evaluation process in research.
    - Future research may need to explore other variables to account for greater variance in models (beyond 30% in this study) predicting asthma knowledge, such as by including factors such as their social support networks and sources of information used for gaining knowledge about asthma.
    - While this study found a substantial amount of variance accounted for in predicting asthma self-efficacy (60%), future research might include additional measures targeting other dimensions of self-efficacy, such as self-efficacy for problem solving, for example.

- The study highlighted how parents with a child with asthma, who have other children may need to be targeted for special support and interventions, given key findings: the significant correlation showing t**he higher the score for asthma knowledge (on the TAKT-40), then** *the **lower** the number of children (r = -.432, p= .000);* the finding in the backwards stepwise regression, when controlling for social desirability, that a significant predictors of **(1) a higher asthma knowledge (on the TAKT-40)** included ***Lower** number of children (B=-1.014, P=.001);* and, an emergent theme from the analysis of qualitative data: i.e. *Balancing child with asthma and other child(ren)'s medical needs).*
- Similarly, the study suggests that mothers facing many barriers to their child's asthma care may need to be targeted for special support and interventions: *i.e.,* in light of findings from the backwards stepwise regression that **(2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors** was significantly predicted by: ***Fewer Barriers** to Child's Health Care (B= - .049, p=0.023)*
- Given that African American children present asthma health disparities and need more specialist care to achieve asthma control, special efforts could be made to target this population—as well as all urban, low-income families living in low quality housing stock plagued with environmental triggers, including Hispanics and immigrants. This could be done via community-outreach (post-pandemic), and via school-based interventions, faith-based interventions, and college-based interventions as key anchor institutions.

- The TAKT-40 could be projected on a large screen during professional development sessions with teachers, enabling them all to improve their asthma knowledge and self-efficacy to respond to their students' symptoms, in ways that are appropriate (e.g., reminders, prompt to see the nurse and use their rescue inhaler; or improve their understanding nocturnal asthma and better assist sleep deprived children, or frequently absent children, etc.)
- The TAKT-40 could be projected on a large screen in classes with older children and adolescents with sufficient reading comprehension, being the centerpiece of sessions led by nurses, health educators, or teachers, while ensuring that the information shared is made grade and age appropriate.
- Faith-based centers in the community (e.g., mosques, churches, temples) could also hold sessions where the TAKT-40 is projected on a large screen so as to educate their community of members and increase their asthma knowledge and self-efficacy to care for children in their community with asthma.
- College and university students could also be exposed to the TAKT-40 via large online message boards that advertise information—adding health information that may enable them to be more responsible family and community members in helping to manage child asthma; or, health education classes could include assignments where students use the online TAKT-40 to increase their asthma knowledge and self-efficacy;

or, health education classes could include assignments where the students engage in projects that involve the dissemination of the TAKT-40, perhaps with an evaluation component with a sample using the pre- and post- evaluation tools—also as a way for students to engage in community-based research projects with a meaningful purpose with potential significant community impact.

- Future research can also explore the risk of exposure that a child with asthma may face to **environmental asthma triggers in both their primary and secondary home**. The tools created for investigating such factors were based on triggers identified in the research literature, while ambitious in scope, yet having great utility in future research: i.e. **Part VI: Exposure to Environmental Asthma Triggers in Primary Home (ETEAT-IPH-16); Part VII: Exposure to Environmental Asthma Triggers in Secondary Home (ETAT-ISH-16).** However, the reality of a small sample size and the study ending up being just a pilot, led to important changes in scoring—that may give rise to a more powerful final tool for use in future research. Future research should reduce the response burden on parents by making items dichotomous, and also reduce the challenge of data analysis—producing, as in this study, a final 8-point ratings scale or index of risk, as explained in Chapter III, methods, while combining responses to survey Part VI and VII, for primary and secondary home risks, respectively.

The results of all these proposed actions can be both valuable community-based interventions and research of value—which may have a cumulative impact in improving

asthma knowledge and self-efficacy for asthma control and management—with potential wide impact.

Limitations of the Study

A limitation of this study is that it was an online study. Further, mothers were not stratified according to reported severity of their child's disease prior to taking ***The Asthma Knowledge Test for Parents (TAKT-40)***. This implication was similar to circumstances identified by Agusala et al. (2018) in their own study, who agreed that "it remains to be concluded if educational intervention is limited to effectiveness by the severity of the patient's symptoms" (p. 3180). This study also used self-reported data with a likelihood of participants providing socially desirable responses, such as downplaying the severity of disease. Future studies might benefit from exploring the relationship between severity of disease and mothers' asthma knowledge and self efficacy.

This study was implemented as a cross-sectional study conducted at one single point in time. The sample of this study was also based on a convenience sample which is vulnerable to multiple potential biases, including selection bias. Lastly, the study was conducted online which requires access to computers, and a reliable internet connection to complete the study survey. This study was implemented during the Covid-19 pandemic and in the wake of the 2021 insurrection, which resulted in social media companies altering the rules and policies, overcompensating for the spread of misinformation.

Conclusion

The present study was a mixed-method pilot study that contributes to a growing body of research in the area of childhood asthma (Khreis et al., 2021; Kuang et al., 2021; Kulikova et al., 2021; Panisch et al., 2021; Saragondlu Lakshminarasappa et al., 2021). The sample (N=62) had a *mean number of children of 2.31* (min=1, max=6, SD=1.018), and a *mean age of 39.13* (min=27, max=52, SD=5.635), with 66.1% (n= 41) White, 24.2% Black, and 9.7% (n=6) Hispanic—with 88.7% living with a partner (n=55). The mean level of education was category 4.44 (min=1, max=7, SD=1.386) for *between Some College and Master's degrees*, with 61.3% of mothers employed (n=38), and a mean annual household income of *category 4.03* (SD=1.727) for *between $100,000 – $199,999*.

The *mean age for children was 9.06* (min=6, max=14, SD=2.36), with a *mean of 7.51 years since the asthma diagnosis* (min=1, max=14, SD=2.50), with 98.4% (n=61) having prescribed medication for asthma management, 80.6% (n=50) currently taking medication—with 50.0% (n=31) taking medication as prescribed at home, and 30.6% (n=19) taking medication as prescribed when away from home. For the **extent of negative impacts from asthma on child, parent, and family**, findings showed: 90.3% had ever missed school or been absent from school due to asthma, 83.9%) of parents had ever missed work due to their child's asthma, and 98.4% of mothers and/or family members ever experienced a great deal of stress and anxiety due to managing their child's asthma. Also, mothers reported barriers to managing their child's health care with a *mean of 3.53* (min=1, max=12, SD=3.192) *for a moderate amount of barriers*—such as their work schedule (50%, n=31).

This research, while with a small sample (N=62), provided important suggestive findings on the value of a new brief online e-health intervention, The Asthma Knowledge Test for Parents (TAKT-40), which will be made available in the public domain now that this study is completed. For the mothers' level of asthma knowledge, *the TAKT-40 mean score was 37.90* (Min=22, max=40, SD=2.768) for *high asthma knowledge*.

Suggestive of the TAKT-40 being a potential brief online intervention of value in the future, paired t-tests were suggestive in this pilot, showing that mother's self-ratings for their level of knowledge were **higher after** they had taken the TAKT-40 with all true answers when compared to their self-ratings of their knowledge before they had taken the TAKT-40. Also, mothers' self-efficacy was **higher after** they had taken the TAKT-40 when compared to self-ratings of self-efficacy before they had taken the TAKT-40 for the behavior of taking care of their child with asthma and helping their child achieve asthma control. Also, 77.4% of mothers indicated that they would recommend taking ***The Asthma Knowledge Test for Parents (TAKT-40)*** to others with a child with asthma (N=48). This is an optimal outcome and in support of Rogers's (1995) diffusion of innovation theory.

In the backwards stepwise regression, when controlling for social desirability, the significant predictors of **(1) a higher asthma knowledge (on the TAKT-40) were**: ***Higher*** *annual household income (B= .449, P=.015)*; ***Lower*** *number of children (B=-1.014, P=.001);* ***Greater extent of negative impacts*** *from asthma on child, parent, and family (B=.921, P=.004)*—30.0% of the variance predicted (R^2= 0.346, adjusted R^2= 0.300) with this model. Future research may need to explore other variables to account for greater variance, such as including factors such as their social support

networks and sources of information used for gaining knowledge about asthma. And, mothers were a greater number of children may need to be targeted for interventions.

Secondly, while controlling for social desirability, the results of the backwards stepwise regression found **(2) a high asthma self-efficacy (on the Scale 2-Asthma Self-efficacy) for the three key behaviors** was significantly predicted by: ***Fewer Barriers*** *to Child's Health Care (B= - .049, p=0.023)*—with 60.0% of variance was predicted (R^2= 0.91, adjusted R^2= 0.60). Mothers facing many barriers to their child's asthma care may need targeting for special support and interventions. This is a substantial amount of variance accounting for asthma self-efficacy, while future research might include additional measures targeting other dimensions of self-efficacy, such as self-efficacy for problem solving.

Implications and recommendations for future practice and research were offered, while qualitative data reinforced the findings. Collectively, the future of asthma control and management may be substantially brighter for children, parents, and families, if the suggestive findings from this pilot study permit the realization of what has been recommended.

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Appendix A

Letter of IRB Approval

TEACHERS COLLEGE
COLUMBIA UNIVERSITY

Teachers College IRB *Exempt Study Approval*

To: Erin-Leigh Gallop
From: Myra Luna Lucero, Research Compliance Director
Subject: IRB Approval: 21-129 Protocol
Date: 12/30/2020

Thank you for submitting your study entitled, "*THE DESIGN AND EVALUATION OF THE ASTHMA KNOWLEDGE TEST FOR PARENTS AS A BRIEF E-HEALTH ONLINE INTERVENTION: PREDICTORS OF MOTHERS' ASTHMA KNOWLEDGE AND SELF-EFFICACY TO MANAGE CHILDHOOD ASTHMA*;" the IRB has determined that your study is **Exempt** from committee review (Category **2**) on 12/30/2020.

Due to COVID-19 quarantine, all in-person study activities with human subjects are suspended. Following guidance from New York State and Teachers College, the Institutional Review Board will announce when in-person research can resume and what steps to take at that time.

Please keep in mind that the IRB Committee must be contacted if there are any changes to your research protocol. The number assigned to your protocol is **21-129**. Feel free to contact the IRB Office by using the "Messages" option in the electronic Mentor IRB system if you have any questions about this protocol.

Please note that your Consent form bears an official IRB authorization stamp and is attached to this email. Copies of this form with the IRB stamp must be used for your research work. Further, all research recruitment materials must include the study's IRB-approved protocol number.

As the PI of record for this protocol, you are required to:

- Use current, up-to-date IRB approved documents
- Ensure all study staff and their CITI certifications are on record with the IRB
- Notify the IRB of any changes or modifications to your study procedures
- Alert the IRB of any adverse events

You are also required to respond if the IRB communicates with you directly about any aspect of your protocol. Failure to adhere to your responsibilities as a study PI can result in action by the IRB up to and including suspension of your approval and cessation of your research.

You can retrieve a PDF copy of this approval letter from Mentor IRB.

Best wishes for your research work.

Sincerely,
Dr. Myra Luna Lucero
Research Compliance Director
IRB@tc.edu

Appendix B

The Study Email

ARE YOU THE MOTHER OF A
CHILD AGED 6-14 WITH ASTHMA?
PLEASE VOLUNTEER FOR OUR STUDY!

The Research Group on Disparities in Health (RGDH) within the Department of Health and Behavior Studies at Teachers College, Columbia University, in New York, New York is conducting a study. We are looking for mothers with **at least one child aged 6 to 14 years diagnosed by a healthcare provider or pediatrician with ASTHMA**. We are seeking to understand what helps Mothers in working with their children to improve asthma control.

- Participation in this survey is limited to the first 250 volunteer
- Completing the online survey takes about 15-20 minutes
- Those who complete the survey will have a 3 in 250 chance of winning 1 of 3
- $100 Amazon gift cards
- Please click on the link below to view the informed consent, learn about your rights as a participant and proceed to the survey.
- We also invite you to forward this email to others who may be willing to volunteer, or send them a text message, or tweet out the message, below:

  CLICK ON: https://tinyurl.com/Asthma-Survey-for-Mothers - And take the Survey for Mothers of a Child Age 6-14 with Asthma (Takes 15-20 Minutes) for a chance to win one of three $100 Amazon gift cards

THANK YOU FOR YOUR PARTICIPATION!

If you have any questions or would like to have additional information about the study, please contact:

Erin-Leigh Gallop, MS, Doctoral Candidate, Department of Health and Behavior Studies, Teachers College, Columbia University, Box 114, 525 W. 120th Street, New York, NY 10027; eg2834@tc.columbia.edu;

BARBARA C. WALLACE, Ph.D., Director, Research Group on Disparities in Health, Professor of Health Education, Clinical Psychologist, Department of Health and Behavior Studies, Teachers College, Columbia University, Box 114, 525 W. 120th Street, New York, NY 10027; bcw3@tc.columbia.edu; Study Contact Number: 267-269-7411

Appendix C

The Study Text/Tweet

CLICK ON: https://tinyurl.com/Asthma-Survey-for-Mothers - And take the Survey for Mothers of a Child Age 6-14 with Asthma (Takes 15-20 Minutes) for a chance to win one of three $100 Amazon gift cards

Appendix D

Study Screening Tool

We are looking for mothers with **at least one child aged 6 to 14 years diagnosed by a healthcare provider or pediatrician with ASTHMA.** Mothers will be asked to spend **about 15-20 minutes** answering questions about themselves, their children, the care of their child's asthma, and what they know about asthma.

Find out if you qualify for study participation and a chance to win one of three $100 Amazon gift cards by answering the following questions:

1-Are you a woman age 21 or older?
Yes ___ No___
2-Are you able to read and understand English on a high school level?
Yes ___ No___
3-Are you the parent or guardian of at least one child aged 6 to 14 diagnosed by a healthcare provider or pediatrician with ASTHMA?
Yes ___ No___
4-Are you willing and able to spend about **15-20** minutes answering survey questions—about yourself, your children, the care of your child's asthma, and what you know about asthma?
Yes ___ No___

If you answered YES to all the above, then please continue with this survey.
If you answered NO to any of the above questions, then please discontinue and EXIT now. Thank you for your interest. This survey is not for you. You can forward the link you used to access the survey to a woman who you think could answer YES to the questions, above.

Appendix E

Informed Consent

Teachers College, Columbia University
525 West 120th Street
New York NY 10027
212 678 3000

INFORMED CONSENT

IRB Protocol Number 21-129

Protocol Title:

The design and evaluation of the asthma knowledge test for parents as a brief e-health online intervention: Predictors of mothers' asthma knowledge and self-efficacy to manage childhood asthma

Principal Researcher: Erin-Leigh Gallop, MS
Teachers College, Columbia University
201-694-9599; eg2834@tc.columbia.edu

INTRODUCTION You are invited to participate in this research study called the "The design and evaluation of the asthma knowledge test for parents as a brief e-health online intervention: Predictors of mothers' asthma knowledge and self-efficacy to manage childhood asthma." You may qualify to take part in this research study if you: 1) are the Mother (guardian) of a child aged 6 to 14 who was diagnosed by a healthcare provider or pediatrician with ASTHMA; and, 2) are at least age 21 or older. Approximately 250 people will participate in this study and it will take 15 to 20 minutes of your time to complete.

WHY IS THIS STUDY BEING DONE? This study is being done to learn about what helps Mothers in working with their children to improve asthma control.

WHAT WILL I BE ASKED TO DO IF I AGREE TO TAKE PART IN THIS STUDY? If you decide to participate in the study, you will answer a series of questions in an online survey. The questions will cover the following: your personal background, including any history of asthma; the background of your child with asthma; any barriers you experienced to your child seeing a provider for care; about potential triggers for asthma; important facts about asthma; and, open-ended questions about what you find to be most stressful when caring for your child's asthma and your coping strategies for achieving asthma control.

WHAT POSSIBLE RISKS OR DISCOMFORTS CAN I EXPECT FROM TAKING PART IN THIS STUDY? The risks of study participation include the possibility that you may feel some discomfort from taking the survey or some stress due to some of the questions. However, your participation in this study is completely voluntary, and you can stop at any time.

WHAT POSSIBLE BENEFITS CAN I EXPECT FROM TAKING PART IN THIS STUDY? There is no direct benefit to you for participating in this study.

WILL I BE PAID FOR BEING IN THIS STUDY? You will not be paid to participate. However, when you complete the survey you will be invited to enter your email address and to hit a "submit" button—so that you are officially entered into a drawing for a chance to receive a prize (i.e., 1of 3 bar coded Amazon gift certificates for $100). You do not have to enter the lottery drawing to complete the survey. Once you submit your email address, then it will automatically be entered into a private and secure data base that even the principal investigator cannot access. Once 250 people have completed the entire survey, you will have a 3 in 250 chance of winning 1 of 3 $100 bar coded Amazon gift certificates. The www.Amazon.com gift certificates will be sent to three randomly chosen e-mail accounts using a secure online program. This occurs without in any way linking your identity to the survey results. The principal investigator is not able to view any of the e-mail addresses to which the gift certificates are sent. Only the 3 winners will be contacted.

WHEN IS THE STUDY OVER? CAN I LEAVE THE STUDY BEFORE IT ENDS? The study is over when you have completed the online survey. However, you can leave the study at any time even if you have not finished.

PROTECTION OF YOUR CONFIDENTIALITY The study does not involve collecting any of your personal identifying information, such as your name or address, allowing you to remain anonymous. (NOTE: Recall, as per what is above, you can elect to enter your e-mail address to enter the drawing for a chance to receive a prize. However, this occurs without in any way linking your identity to your survey answers, and the principal investigator cannot view any e-mail addresses.) Teachers College, Columbia University has determined that www.Qualtrics.com provides a secure platform for the online survey you will take. The survey data files will also be saved on the primary researcher's password protected computer. Regulations require that research data be kept for at least three years.

For quality assurance, the study team, and/or members of the Teachers College Institutional Review Board (IRB) may review the data collected from you as part of this study. Otherwise, all information obtained from your participation in this study will be held strictly confidential and will be disclosed only with your permission or as required by U.S. or State law.

HOW WILL THE RESULTS BE USED? The results of this study will be published in journals and presented at academic conferences. This study is being conducted as part of the doctoral dissertation of the principal investigator.

WHO CAN ANSWER MY QUESTIONS ABOUT THIS STUDY?
If you have any questions about taking part in this research study, you should contact the primary researcher, Erin-Leigh Gallop, at 201-694-9599 or at eg2834@tc.columbia.edu. You can also contact the sponsor/supervisor of this research study, Dr. Barbara Wallace, at bcw3@tc.columbia.edu or 267-269-7411.

If you have questions or concerns about your rights as a research subject, you should contact the Institutional Review Board (IRB) (the human research ethics committee) at 212-678-4105 or email IRB@tc.edu. Or you can write to the IRB at Teachers College, Columbia University, 525 W. 120th Street, New York, NY 10027. Box 151. The IRB is the committee that oversees human research protection for Teachers College, Columbia University.

PARTICIPANT'S RIGHTS

- I have read the Informed Consent Form and have been offered the opportunity to discuss the form with the researcher.
- I have had ample opportunity to ask questions about the purposes, procedures, risks and benefits regarding this research study.
- I understand that my participation is voluntary. I may refuse to participate or withdraw participation at any time without penalty.
- The researcher may withdraw me from the research at his or her professional discretion. I understand that if I take the survey more than once I will be eliminated from the study.
- If, during the course of the study, significant new information that has been developed becomes available which may relate to my willingness to continue my participation, the researcher will provide this information to me.
- Any information derived from the research study that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- I should receive a copy of the Informed Consent Form document. (I understand that I can download it).

By signing electronically, you agree to be in the study and confirm that you are age 21 or above and the mother of a child aged 6 to 14 who was diagnosed with asthma.

Provide your electronic signature:

_____ **Date**: _____

Appendix F

Study Survey

SURVEY FOR MOTHERS OF A CHILD AGE 6-14 WITH ASTHMA

PART I: PARENTS' BASIC DEMOGRAPHICS (P-BD-8)

[This survey part follows the work of Hosam (2020)—as a common tool used by the Research Group on Disparities in Health (RGDH). It was also last used in Alrqiq (2020). See: Alrqiq, H. (2020). *Use of an animated video for child oral health education as a brief online intervention designed for parent-child dyads: Predictors of parental self-efficacy to engage in recommended behaviors*. Doctoral dissertation. Teachers College, Columbia University. Questions on place of birth were eliminated to shorten the survey.]

1) MY gender is:
   a. ___Female b. ___Male
2) MY age is: _____
3) MY race/ethnicity is as follows: (Please mark all that apply)

A. □ White B. □ Black/African American
C. □ Hispanic/Latino D. □ Asian
E. □ Pacific Islander F. □ Native American
G. □ Other (Please explain)_____

4) I AM currently:

a. ___Single b. ___Married c. ___Separated d. ___Divorced
e. ___Widowed f. ___In Domestic Partnership g. ___Living with Significant Other

5) I am currently (check all that apply)
   a. ____part-time undergraduate student
   b. ____ full-time undergraduate student
   c. ____ part-time graduate student
   d. ____ full-time graduate student
   e. ____employed
   f. ____unemployed
   g. ____homemaker
   h. ____on Welfare
   i. ____receiving Social Security Income
   j. ____receiving Social Security Disability Income
   k. ____receiving Worker's Compensation
   l. ____retired
   m. ____Other (please explain_____)

6-MY yearly household income is:
$10,000 to $19,000
$20,000 to $39,000
$40,000 to $49,000
$50,000 to $99,999
$100,000 to $199,999
$200,000 to $299,000
$300,000 to $399,000
$400,000 to $499,000
$500,000 to $799,000
$800,000 or More

7- MY highest education level is:
- ☐ Less than high school
- ☐ High school or high school equivalent (GED)
- ☐ Some college
- ☐ 2-year college degree (Associates)
- ☐ 4-year college degree (Bachelor's)
- ☐ Master's degree
- ☐ J.D. - Lawyer
- ☐ Doctoral Degree (Ph.D., Ed.D., etc.).
- ☐ Medical Degree (M.D., D.D.S., etc.)

8- How many children do you have? [Drop down menu 1-10]

PART II: ABOUT THEIR CHILD WITH ASTHMA (ATCWA-13)

[This is a new measure created for this study by the Principal Investigator and Dr. Barbara Wallace for first time use in this study, and for use by the Research Group on Disparities in Health (RGDH). This tool includes two scales: **Medication Adherence Scale (2 questions), and Asthma Impact Scale (3 questions).]**

1-Do you have at least ONE CHILD diagnosed with asthma by a health care provider or pediatrician?
__Yes ___No. (if answer NO✍exclude from study)

2-How old is this CHILD you will be keeping in mind as you answer questions for this survey? **[Drop down menu 4 -18].**
NOTE: If age of child is less than 6 or more than 14✍ exclude from study

3-My CHILD is currently in the following grade:
__Kindergarten ___1st grade ___2nd grade ___3rd grade ___4th grade`
___5th grade ___6th grade ___7th grade ___8th grade. (other___)

4-My CHILD currently attends a
___ public school
___ charter school
___ parochial school
___ private school

5-Please estimate the number of years your child has had asthma—or number of years since diagnosed with asthma?
[DROP DOWN MENU 0-20, exclude from study if select 0, or 15-20]
(an important continuous variable in the regression)

6-Was your child ever **tested for allergies** (to find out what they are allergic to)?
__Yes ___No.

7-Was your child **ever prescribed**/given any medication for their asthma by their health care provider or pediatrician?
__Yes ___No.

8-Is your child **currently taking** any medication for their asthma that has been prescribed/given by a health care provider or pediatrician?
__Yes ___No.

Medication Adherence Scale (2 questions):

9-Please rate HOW OFTEN your child is receiving their asthma medication WHEN THEY ARE AT HOME the way they are supposed to, or the way their healthcare provider or pediatrician wants your child to take it.
5-All the time 4-Most of the time 3-Sometimes 2-Rarely 1-Never. __I don't know
__Not applicable/my child is not taking asthma medication at this time

10-Please rate HOW OFTEN your child is receiving their asthma medication WHEN THEY ARE NOT AT HOME the way they are supposed to, or the way their healthcare provider or pediatrician wants your child to take it.
5-All the time 4-Most of the time 3-Sometimes 2-Rarely 1-Never. __I don't know
__Not applicable/my child is not taking asthma medication at this time

Asthma Impact Scale (3 questions):

11-How often has your child missed school or been **absent from school** due to asthma.
5-Extremely often 4-Many times 3-Sometimes 2-Rarely 1-Never. __I don't know

12-How often have you or a co-parent/caretaker **missed work** due to taking care of your child's asthma—whether for visits to an emergency room, a healthcare provider/ pediatrician, or for staying home with your sick child due to their asthma.
5-Extremely often 4-Many times 3-Sometimes 2-Rarely 1-Never. __I don't know

13-How often have you and/or your family members experienced **a great deal of stress and anxiety** due to the challenges of managing your child's asthma symptoms.
_Never _Many times _Sometimes _Rarely __Never _I don't know

PART III: BARRIERS TO CHILD'S HEALTH CARE (C-OB-CHC-12)

[This was a new scale created for use in Alrqiq (2020)—and for use by the Research Group on Disparities in Health (RGDH). Questions were modified to address seeing a healthcare provider or pediatrician versus being about dental care. From Alrqiq (2020), the original numbers 1 and 2 were deleted (not knowing how often or where to take my child for care). Other items were replaced, adding items arising from the review of literature for this study: e.g.. an item on lack of transportation, etc.]

A Continuous Scale (0-12) results, summing items for Yes=1 and No=0 for barriers.

I have experienced the following barriers or obstacles to getting my child with asthma to see a healthcare provider or pediatrician (or other specialists) as often as I would like or recommended: (check all that apply)

1-__ stress in my life __*YES (1)* __*NO (0)*
2-__ lack of transportation to and from providers __*YES (1)* __*NO (0)*
3-__ my work schedule __*YES (1)* __*NO (0)*
4-__ lack of sufficient hours for when the clinic is open/provider available
__YES (1) __NO (0)
5-__ lack of continuity in care—or seeing a different provider each time
__YES (1) __NO (0)
6-__ lack of trust in providers and the medical system __YES (1) __NO (0)
7-__ lack of insurance __*YES (1)* __*NO (0)*
8-__ lack of finances/money __*YES (1)* __*NO (0)*
9-__ lack of time, or other demands on my time __*YES (1)* __*NO (0)*
10-__ my own health issues (physical or mental) __*YES (1)* __*NO (0)*
11-__ the health issues (physical or mental) of others (e.g. other children, husband/partner, babysitter, other family, my parents, etc.) __*YES (1)* __*NO (0)*
12-__ other/something else has been an obstacle/barrier for me (Please indicate in the space, below) __*YES (1)* __*NO (0) Explain*_____

PART IV: PARENTAL HISTORY OF ASTHMA AND ANY CURRENT SELF-MANAGEMENT OF ASTHMA WITH MEDICATION BY MOTHER (PHA-ACSMA-WMBM-4)

[This is a new scale created for first time use in the study by the Principal Investigator and Dr. Barbara Wallace—and for use by the Research Group on Disparities in Health (RGDH).]

NOTE FOR # 4: an independent variable in regression is YES (1) or NO (0) for mother currently engages in self-management of her own asthma.
[SCORE 1, YES= MOM CURRENTLY <u>DOES</u> SELF-MANAGE OWN ASTHMA WITH MEDICATION- YES.
[SCORE 0, NO = MOM <u>DOES NOT</u> CURRENTLY SELF-MANAGE OWN ASTHMA WITH MEDICATION- NO]

1-To the best of your knowledge, was your CHILD's biological FATHER ever diagnosed with asthma, or had asthma?
__Yes. __No. __Not sure/Don't know

2- Are you the child's biological mother (not adopted)? __Yes. __No.

3-Were you ever diagnosed with asthma, or had asthma?
__Yes. __No. __Not sure

IF YES✍ answer next question.

*4-Please check the option that best applies to you:

1=_I am CURRENTLY (NOW) taking asthma medication
0=_I am not CURRENTLY (NOW) taking asthma medication (no asthma, or no need to take medication for asthma)
0=_I used to take asthma medication, but no longer do
0=_I have never had a need to take asthma medication in my entire life

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PART V: SINGLE ITEM RATING OF RISK OF PROVIDING SOCIALLY DESIRABLE RESPONSES (SIR-RPSDR-1)

[Note: This is a new single item scale created for first time use by Dr. Barbara Wallace in studies in 2018, and for the Research Group on Disparities in Health [RGDH], in general. For example, this tool was used by Laryea (2019). See: Laryea, E. (2019). *An online mixed-methods study assessing nurses' attitudes, knowledge, skill/ability, and perceived barriers with regard to adherence to the national pressure ulcer advisory panel's clinical practice guidelines*. Doctoral dissertation. Teachers College, Columbia University. Note: Laryea (2019) found that the new one item measure of social desirability was one of two significant predictors of nurses' higher personal skill/ability rating for managing patients' pressure ulcers. This was noteworthy, as the well-known 13-item measure of social desirability [i.e. Crowne, D., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology, 24*(4), 349-354.] was found to be the sole significant predictor of nurses' ratings for a higher personal skill/ability for managing patients' pressure ulcers. Hence, there is value in reducing the burden of time on study participants and using in this study the new one item measure of social desirability.]

1-I sometimes say things that I think will please people, or what I think they want to hear—versus the honest truth, which might be difficult or painful for other people to hear and accept, or might lead them to judge me harshly…

I rate myself on a scale of 0 to 10, as follows:

0	1	2	3	4	5	6	7	8	9	10
0-I am not like this at all										10-I am like this all the time

---

PART VI: EXPOSURE TO ENVIRONMENTAL ASTHMA TRIGGERS IN PRIMARY HOME (ETEAT-IPH-16)

[This is a new tool created by the Principal Investigator and the Dr. Barbara Wallace for first time use in this study, and use by the Research Group on Disparities in Health (RGDH)]

2 SCREENING/BACKGROUND QUESTIONS FOR THIS SURVEY PART

1-My child lives with me.
5-always 4_almost always 3_sometimes 2_rarely 1 _never (1 or 2✍ exclude from sample)

2-I have a partner who lives with me or visits frequently, including spending the night
5-always 4_almost always 3_sometimes 2_rarely 1 _never _Not Applicable/I have no partner

[NOTE: QUESTIONS FOR PRIMARY HOME MATCH THOSE FOR SECONDARY HOME IN PART VII]

SCORING DECISIONS WITH PRESENT SAMPLE LED TO REFINEMENTS IN THIS TOOL, PRODUCING A FINAL EMERGENT TOOL—WITH SCORING, AS FOLLOWS:

- **CREATED A COUNT OF 8 ASTHMA ENVIRONMENTAL RISK FACTORS (8 DICHOTOMOUS YES=1; NO=0) (reported descriptively as a score ranging from 0 to 8, as an independent variable for use in subsequent analyses)**

1-ASTHMA ENVIRONMENTAL RISK FACTOR # 1—ANY SMOKER IN THE HOME: COMBINED ITEMS # 1, # 2, and # 12 for SINGLE VARIABLE FOR ASTHMA RISK FROM ANY SMOKER IN THE HOUSE –SCORED 1=YES OR 0=NO

1-I smoke cigarettes, or vape, or smoke something else such as medical marijuana/ other marijuana inside my home.

5-always 4_almost always 3_sometimes 2_rarely 1 _never

NOTE ON NEW DICHOTOMIZED SCORING: ALWAYS TO RARELY = YES=1 OR NEVER/NO=0

2-My partner who lives with me or visits often smokes cigarettes, or vapes, or smokes something else (e.g. medical marijuana/other marijuana, etc.) inside my home

5-always 4_almost always 3_sometimes 2_rarely 1 _never _Not Applicable/I have no partner

NOTE ON NEW DICHOTOMIZED SCORING: ALWAYS TO RARELY = YES=1. NEVER/NO=0

2-ASTHMA ENVIRONMENTAL RISK FACTOR # 2—LIVES IN URBAN SETTING: SCORED 1=YES or 0=NO

3-Where we live may best be described as

3___Urban. 2 __Suburban 1 __Rural _I don't know

NOTE ON NEW DICHOTOMIZED SCORING: URBAN YES=1. NOT URBAN NO=0

3-ASTHMA ENVIRONMENTAL RISK FACTOR # 3—LIVES IN OLDER HOUSING STOCK: SCORED 1=YES (≥ 25 YEARS OLD) or 0=NO (<25 YEARS OLD)

4-Where we live may also be described as

NOTE ON DICHOTOMIZED SCORING: 25 YEARS OF OLDER -- YES=1 OR NO=0

___an **apartment building** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___a **condominium** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___a **row house** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___a **free standing single house** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___a **free standing twin house** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___**other (please explain)** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less

4-ASTHMA ENVIRONMENTAL RISK FACTOR # 4—RISK FROM HOUSING IN POOR CONDITION: 1=YES IF POOR CONDITION SCORED, or 0=NO

5-I would rate where we live….

For overall quality of the building structure, and the building's state of repair or disrepair, and for any problems with leaks, holes, heating, ability to control heat, air circulation, etc.:
5-excellent 4-very good 3-fair 2-poor 1-very poor

NOTE ON DICHOTOMIZED SCORING: POOR TO VERY POOR—YES=1 OR NO=0

5-ASTHMA ENVIRONMENTAL RISK FACTOR # 5—RISK FROM ANY ROACHES, MICE OR OTHER PESTS IN HOME: SCORED 1=YES or 0=NO

6- I would rate where we live….

NOTE ON DICHOTOMIZED SCORING: ALWAYS TO SOMETIMES= YES=1 OR NO=0

For having a problem with **roaches**: *5-always 4_almost always 3_sometimes 2_rarely 1 _never*

7- I would rate where we live….

For having a problem with **mice**: *5-always 4_almost always 3_sometimes 2_rarely 1 _never*

8- I would rate where we live….

For having a problem with **rats**: *5-always 4_almost always 3_sometimes 2_rarely 1 _never*

9- I would rate where we live….
For having a problem with **squirrels**: *5-always 4_almost always 3_sometimes 2_rarely 1 _never*
10- I would rate where we live….
-For having a problem with **raccoons/other**: *5-always 4_almost always 3_sometimes 2_rarely 1 _never*

- **NOTE: DELETED AS AN ASTHMA ENVIRONMENTAL RISK FACTOR–VIEWED AS A TOO INDIRECT A MEASURE OF ENVIRONMENTAL ASTHMA RISK FACTOR**

11-Where we live has the following **number of people** also living here:
[DROP DOWN MENU FROM 0 TO 20]

- **NOTE ON SCORING: COMBINES WITH ITEMS 1 AND 2, ABOVE TO CREATE ASTHMA ENVIRONMENTAL RISK FACTOR # 1: CREATES COMBINED VARIABLE FOR ANY SMOKER IN THE HOUSE—YES=1, NO=0**

12-Where we live has the following **number of smokers** (e.g. cigarettes, vaping, marijuana, etc.) also living here: [was dichotomized to yes smokers or no smokers]
[DROP DOWN MENU FROM 0 TO 20]
NOTE ON DICHOTOMIZED SCORING: YES, IF GREATER THAN ZERO SMOKERS -- YES=1 OR NO=0

13-When it comes to **going outside to smoke**, the smokers where we live
NOTE ON DICHOTOMIZED SCORING: SOMETIMES/RARELY/NEVER GO OUTSIDE – YES FROM SMOKING RISK=1 OR NO FROM SMOKING RISK=0
1_**always** go outside to smoke
2_**almost always** go outside to smoke
3_**sometimes** go outside to smoke
4_**rarely** go outside to smoke
5_**never** go outside to smoke
_**Not applicable**/ no smokers live there

14-When it comes to **smoking inside the house**, the smokers where we live
NOTE ON DICHOTOMIZED SCORING: ALWAYS/ALMOST ALWAYS/ SOMETIMES/RAREL SMOKE INSIDE – YES FROM SMOKING RISK=1 OR NO FROM SMOKING RISK=0
5_**always** smoke inside
4_**almost always** smoke inside
3_**sometimes** smoke inside
2_**rarely** smoke inside
1_**never** smoke inside
_**Not applicable**/ no smokers live there

6-ASTHMA ENVIRONMENTAL RISK FACTOR # 6—RISK FROM ANY PET EXPOSURE IN THE HOME: ANY PET IN HOME – SCORED 1=YES or 0=NO

15-Where we live has the following **number of cats and/or dogs also living inside** with us

[DROP DOWN MENU 0-12]

NOTE ON DICHOTOMIZED SCORING: AT LEAST ONE PET = YES=1 NONE=NO=0

7-ASTHMA ENVIRONMENTAL RISK FACTOR # 7—RISK FROM NEARBY TRUCK ROUTES: YES = 1 FOR SOMEWHAT TO EXTREMELY CLOSE; NO= NOT CLOSE AT ALL

16- For where we live, I would rate our closeness to roads, streets, and highways where there are **large trucks that regularly drive by** as:

1-Not close at all 2-Somewhat close 3-Neither close or far 4-Very close 5-Extremely close _Not sure

NOTE ON DICHOTOMIZED SCORING: 1=YES = SOMEWHAT TO EXTREMELY CLOSE; NO= NOT CLOSE AT ALL

SEE PART VII, BELOW FOR 8-ASTHMA ENVIRONMENTAL RISK FACTOR # 8: ASTHMA RISK FROM SECONDARY HOME–SCORED 1=YES or 0=NO

PART VII: EXPOSURE TO ENVIRONMENTAL ASTHMA TRIGGERS IN SECONDARY HOME (ETEAT-ISH-16)

[This is a new tool created by the Principal Investigator and the Dr. Barbara Wallace for first time use in this study, and use by the Research Group on Disparities in Health (RGDH)]

8-ASTHMA ENVIRONMENTAL RISK FACTOR # 8: ANY ASTHMA RISK FROM SECONDARY HOME–SCORED 1=YES or 0=NO

- **NOTE: ALL ANSWERS ON PART VII TURNED INTO A SINGLE DICHOTOMOUS VARIABLE # 8 FOR SUBSEQUENT DATA ANALYSES, WHILE RESPONSES ARE USED FOR DESCRIPTIVE PURPOSES:** This decision was made because the frequency of responses for these items was very low, even as scored, as follows.

2 SCREENING QUESTIONS FOR THIS SURVEY PART

1-Does your child live with someone else **at least 4-8 DAYS OUT OF EVERY MONTH, including spending the night there**? For example, you may have joint custody, or the child spends time with their father, your former partner, or a grandmother/grandfather, or aunt/uncle, etc.]

__Yes __No **[If NO, then skip this PART✍GO TO NEXT PART]**

NOTE: IF THERE LESS THAN 4 DAYS A MONTH, THEN SCORED NO

2-Please estimate the number of days per month that your child with asthma lives **some of the time** with someone else (e.g. father, joint custody, your former partner, a grandmother/grandfather, aunt/uncle, etc.), including spending the night there.
[DROP DOWN MENU FROM 0 TO 30. If select 0✍ exclude; if 30✍exclude]
NOTE; IF THERE LESS THAN 4 DAYS A MONTH, THEN SCORED NO

[NOTE: QUESTIONS FOR SECONDARY HOME MATCH THOSE FOR PRIMARY HOME]

[NOTE: Higher score for Items 1-16 means higher exposure to potential triggers for asthma within the SECONDARY HOME]

FOR #1 AND #2 AND #12 COMBINED: NOTE ON DICHOTOMIZED SCORING: ALWAYS TO RARELY = YES=1 OR NEVER/NO=0
1-For where my child lives **some of the time**, the **person mainly responsible** (father, your former partner, a grandparent, aunt/uncle, etc.). for my child at that home smokes cigarettes, or vapes, or smokes something else (e.g. medical marijuana/other marijuana) **in that home.**
5-always 4_almost always 3_sometimes 2_rarely 1 _never _I don't know

2-For where my child lives **some of the time**, the **person mainly responsible** for my child **HAS A PARTNER** in that home who smokes cigarettes, or vapes, or smokes something else (e.g. medical marijuana/other marijuana) **in that home**
5-always 4_almost always 3_sometimes 2_rarely 1 _ _Not applicable (has no partner)

FOR # 3: NOTE ON DICHOTOMIZED SCORING: URBAN YES=1. NOT URBAN NO=0
3-For where my child lives **some of the time** (e.g. shared custody, grandparents, etc.), that setting may best be described as:
3___Urban. 2 __Suburban 1 __Rural _I don't know

4-For where my child lives **some of the time,** it may also be described as:
FOR # 4: SCORED 1=YES (≥ 25 YEARS OLD) or 0=NO (<25 YEARS OLD)
___an **apartment building** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___a **condominium** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___a **row house** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___a **free standing single house** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___a **free standing twin house** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less
___**other (please explain)** *that has been there closest to (your best guess)*
(6) 100 years (5) 50 years (4) 25 years (3) 10 years. (2) 5 years (1) 2 years or less

FOR # 4: SCORED <u>1=YES</u> (<u>≥</u> 25 YEARS OLD) or 0=NO (<25 YEARS OLD5-I would rate where they live….
For overall quality of the building structure, and the building's state of repair or disrepair, and for any problems with leaks, holes, heating, ability to control heat, air circulation, etc.:
5-excellent 4-very good 3-fair 2-poor 1-very poor _I don't know
FOR # 4: SCORED <u>1=YES</u> (<u>≥</u> 25 YEARS OLD) or 0=NO (<25 YEARS OLD)

6- I would rate where they live….
For having a problem with **roaches**: *5-always 4_almost always 3_sometimes 2_rarely 1 __I don't know*
7- I would rate where they live….
For having a problem with **mice**: *5-always 4_almost always 3_sometimes 2_rarely 1 __I don't know*
8- I would rate where they live….
For having a problem with **rats**: *5-always 4_almost always 3_sometimes 2_rarely 1 __I don't know*
9- I would rate where they live….
For having a problem with **squirrels**: *5-always 4_almost always 3_sometimes 2_rarely 1 _ _I don't know*
10- I would rate where they live….
-For having a problem with **raccoons/other**: *5-always 4_almost always 3_sometimes 2_rarely 1 __I don't know*

NOTE: DELETED AS AN ASTHMA ENVIRONMENTAL RISK FACTOR–VIEWED AS A TOO INDIRECT A MEASURE OF ENVIRONMENTAL ASTHMA RISK FACTOR

11-For where my child lives **some of the time,** the following **number of people** also live there:
_I don't know
_ [DROP DOWN MENU FROM 0 TO 20]

WITH # 1 AND # 2, # 12 CREATES COMBINED VARIABLE FOR ANY SMOKER IN THE HOUSE—YES=1, NO=0
12-For where my child lives **some of the time,** the following **number of smokers** (e.g. cigarettes, vaping, marijuana, etc.) also live there:
_I don't know
_ [DROP DOWN MENU FROM 0 TO 20]

NOTE ON DICHOTOMIZED SCORING: SOMETIMES/RARELY/NEVER GO <u>OUTSIDE</u> – YES FROM SMOKING RISK=1 OR NO FROM SMOKING RISK=0

13-When it comes to **going outside to smoke**, the smokers there
_I don't know (do not see what is going on there)
1_**always** go outside to smoke
2_**almost always** go outside to smoke
3_**sometimes** go outside to smoke
4_**rarely** go outside to smoke
5_**never** go outside to smoke
_**Not applicable/ no smokers live there.**

NOTE ON DICHOTOMIZED SCORING: ALWAYS/ALMOST ALWAYS/ SOMETIMES/RAREL SMOKE <u>INSIDE</u> – YES FROM SMOKING RISK=1 OR NO FROM SMOKING RISK=0

14-When it comes to **smoking inside the house**, the smokers there
_I don't know (do not see what is going on there)
5_**always** smoke inside
4_**almost always** smoke inside
3_**sometimes** smoke inside
2_**rarely** smoke inside
1_**never** smoke inside
_**Not applicable/ no smokers live there.**

15-Where my child lives **some of the time** has the following **number of cats and/or dogs also living inside** with them
I don't know ** [DROP DOWN MENU 0-12].**
NOTE ON DICHOTOMIZED SCORING: AT LEAST ONE PET = YES=1 NONE=NO=0

16- For where my child lives **some of the time,** I would rate closeness to roads, streets, and highways where there are **large trucks that regularly drive by** as:
_I don't know
1-Not close at all 2-Somewhat close 3-Neither close or far 4-Very close 5-Extremely close
_Not sure
NOTE ON DICHOTOMIZED SCORING: 1=YES = SOMEWHAT TO EXTREMELY CLOSE; NO= NOT CLOSE AT ALL

PART VIII: ASTHMA KNOWLEDGE TEST FOR PARENTS (TAKT-40)

[This tool reflects a common approach used in studies conducted by the Research Group on Disparities in Health, RGDH—specifically, creating a True-False test where all the answers are Trues, as brief online intervention. For example, see Aiyedun (2014): Aiyedun, A. (2014). *Predictors of high levels of knowledge of the HIV window period among diverse men: An online study that includes evaluations of an avatar video intended as e-health on the HIV window period*. Doctoral dissertation, Teachers College, Columbia University. Most recently, see Afram (2019): *Black men's knowledge of prostate cancer and screening and vitamin D screening and supplementation: Predictors of high self-efficacy to talk to medical providers*. Doctoral dissertation, Teachers College, Columbia University. Hence, this study follows Afram (2019) in creating this survey.]

Please read the following statements. After each statement, please select if you think it is "True" or "False."
[NOTE: Score True=1; False = 0]

1) Asthma is a *chronic disease*, or *chronic respiratory disease* that involves the lungs and difficulty breathing; and, asthma is increasing in children, as the *most common chronic disease for children* **_True _False**
2) A parent may hear their child *wheezing* (making a whistling sound while breathing), or may notice their child *coughing* and having *trouble breathing* (shortness of breath)—as some of the *first signs of asthma*. **_True _False**
3) An important goal is *asthma control*, or achieving (gaining) control of a child's asthma—so asthma attacks are avoided. **_True _False**
4) Achieving *asthma control* requires *keeping regular medical visits* with a healthcare provider/pediatrician, receiving prescriptions (refills) for medication, and making sure medication is taken the way it was prescribed (how told to take). **_True _False**
5) Achieving *asthma control* requires *noticing when asthma symptoms first start* (e.g., trouble breathing) so the child can take medication immediately (e.g., use of a pump, or rescue inhaler to relax lung muscles and widen airways [bronchi] in the lungs). **_True _False**
6) Achieving *asthma control* includes parents and children knowing the importance of the child regularly taking any other maintenance medications exactly as they were prescribed (how told to take). **_True _False**
7) With *asthma control,* a child can avoid missing school, avoid the emergency room and hospital stays, avoid frequent visits with a healthcare provider/pediatrician—and, a parent can avoid missing work, as well as a great deal of stress and anxiety. **_True _False**
8) With *asthma control,* a child can avoid the loss of lung function, avoid long-lasting damage to the lungs, and avoid developing chronic pulmonary disease or COPD later in life. **_True _False**
9) Parents, family members, and anyone who lives with/spends time with a child with asthma (extended family) ALL have an important role to play in *asthma control.* **_True _False**
10) Parents and family members can take action and perform certain behaviors to reduce a child's asthma attacks, and work together to achieve the goal of *asthma control.* **_True _False**
11) For a child to achieve *asthma control* and maintain (keep) that control over time, it is important that no one smokes in the home—or performs the behavior of going outside to smoke. **_True _False**
12) For a child to achieve *asthma control* and maintain (keep) that control over time, it is important that no one smokes around the child, such as in a car or in any room or space shared with the child. **_True _False**
13) For a child to achieve *asthma control* and maintain (keep) that control over time, it is important that they are not exposed to second-hand tobacco smoke (or marijuana, etc.) from someone smoking around them. **_True _False**
14) Second-hand smoke, or someone smoking around a child with asthma is a common trigger for an asthma attack, or a trigger that makes asthma get worse with the **loss** of *asthma control.* **_True _False**

15) There may be many triggers for a child having an asthma attack, or for making asthma worse; and, it is important to help a child avoid these triggers, as much as possible. **_True _False**
16) It is important for a child to be *tested for allergies* by a specialist provider to discover the child's specific triggers (e.g., mold, dust) for an asthma attack or for making asthma worse. **_True _False**
17) It is very important that the place where a child with asthma lives (and sleeps) DOES NOT have triggers for asthma attacks or making asthma worse, *as much as possible*. **_True _False**
18) Compared to White children, African American children with asthma have more severe symptoms, *asthma control* is harder for them to achieve, and they have much higher rates of asthma when living in an urban area. **_True _False**
19) An African American child living in an urban area is more likely to need treatment from specialist providers (experts in asthma care). **_True _False**
20) A child's **home environment** (where they live, what is around them) directly impacts *asthma control*; and, **home visits** by experts can allow them to point out triggers in the home and recommend changes. **_True _False**
21) It is very important that a child with asthma receives or takes their prescribed (given/told to take) medications *daily and correctly*, in order to achieve *asthma control*. **_True _False**
22) When parents were so distrustful of doctors/medical system that they did not give their children the medications prescribed for asthma, then it was found that their children's asthma got worse. **_True _False**
23) A medication usually prescribed (given) for a child with asthma is a ***bronchodilator* (or rescue inhaler for emergencies)** that widens and opens (dilates) airways in the lungs and increases airflow to the lungs—making it easier to breathe, and helping with coughing and wheezing. **_True _False**
24) Some ***bronchodilators* (rescue inhalers for emergencies)** treat asthma symptoms that come on suddenly, unexpectedly, or with exercise/physical activity; they are ***fast-acting*** *and work quickly within a few minutes* to improve breathing. **_True _False**
25) Some ***bronchodilators*** are ***short-acting*** and provide relief from asthma symptoms *for 4 to 5 hours.* **_True _False**
26) If a child only has symptoms of asthma just once in a while (intermittent) and/or symptoms are mild, then the healthcare provider/pediatrician may prescribe (give/told to take) a ***short-acting bronchodilator*** for use, as needed. **_True _False**
27) ***Bronchodilators*** can be prescribed (given) in **three forms**: in a **rescue inhaler***,* or in a **tablet or pill** form to be taken by mouth (oral), or in a **liquid form**. **_True _False**
28) A ***bronchodilator*** in the form of a **rescue inhaler for emergencies** can be held in a child's hand and easily carried in a pocket or backpack, for example. **_True _False**
29) Usually, a child is prescribed (given/told to take) a **metered dose inhaler** that provides a "measured" (exact) amount of the medication to the lungs when the pump device is squeezed by hand. **_True _False**
30) Some children use a **spacer;** their **rescue inhaler**, or **metered dose inhaler** is placed in a plastic tube (called a **spacer**) that delivers into the lungs an exact amount of medication, while adding a few minutes to the task of a child inhaling medication. **_True _False**

31) The liquid form of a ***bronchodilator*** is sometimes used at home in an **asthma nebulizer**; this is a portable machine that turns the liquid into tiny droplets a child breathes into their lungs through a facemask placed over the mouth and nose. **_True _False**
32) If a child needs to take a *fast-acting* ***bronchodilator*** medication every day, this daily indicates *asthma control* **has not been achieved**; the child likely needs a *long-acting* medication prescribed (given) by their healthcare provider/pediatrician. **_True _False**
33) A *long-acting* ***bronchodilator*** that may be prescribed for a child by a healthcare provider/pediatrician is an **inhaled corticosteroid** that is used over the long-term (months, years) to help a child achieve *asthma control.* **_True _False**
34) It can take three years with a child and parent working together with a healthcare provider/pediatrician to achieve *asthma control*; this should include developing an **asthma action plan** (what to do, depending on symptoms) for preventing asthma attacks and achieving *asthma control* **_True _False**
35) The most important action for a child to achieve *asthma control* may be taking an **inhaled corticosteroid**, or an inhaled steroid—and taking it as prescribed (taking exactly how told to take). **_True _False**
36) The **symptoms** of asthma are different in a child compared to an adult; and, a parent with asthma cannot assume that what they do for the management of their personal asthma will also work for their child's asthma. **_True _False**
37) Asthma **symptoms** may be triggered by dust (mites), indoor pollution (cleaning products), hot or cold weather, fragrances/scents, odors, mold (from storm floods), some food additives/chemicals in food, pollen (from plants, or a season when plants are producing more pollen), or outdoor pollution (traffic) with fumes/toxins from diesel or gasoline. **_True _False**
38) Asthma **symptoms** are worse at night for many children—and this is called ***nocturnal asthma (night time).*** **_True _False**
39) ***Noctural asthma,*** and being up at night coping with symptoms of asthma lead to an increase in children being absent from school, and/or being moody the next day—with parents also missing sleep (and being moody).
40) Having a **good diet and nutrition** is important for a child with asthma, helping to protect the child and helping to achieve *asthma control*.

Thank you for completing all these questions.

PART IX: DIFFUSION OF THE INNOVATION OF THE ASTHMA KNOWLEDGE TEST FOR PARENTS (DOI-AKTFP-1)

[This tool reflects a common approach used in studies conducted by the Research Group on Disparities in Health, RGDH—specifically, disclosing all answers were TRUE, after taking a True-False test where all the answers are Trues, as brief online intervention. For example, see Afram (2019) and Aiyedun (2014).]

We created the True-False questions you just completed above, as ***The Asthma Knowledge Test for Parents*—with all TRUE answers**—as a way to assist mothers in managing their child's asthma, or caring for a child with asthma.

After this study, we will widely circulate on the internet a link to the ***The Asthma Knowledge Test for Parents***. We will promote this test as a new way to educate parents so they are better prepared to care for a child diagnosed with asthma.

1-Would you recommend taking the ***Asthma Knowledge Test for Parents*** to others with a child with asthma?
___No ___Yes ___Unsure

PART X: PRE- AND POST-KNOWLEDGE TEST—RATINGS FOR KOWLEDGE AND SELF-EFFICACY TO MANAGE CHILD'S ASTHMA (PRE-A-POST-KT-RF-K-SE-TMCA-8)

[This tool was taken from Afram (2019), yet modified to query about knowledge and self-efficacy for asthma and achieving asthma control—both for before and after taking *The Asthma Knowledge Test for Parents*, above. For the present study, there is a **Scale 1-Asthma Knowledge** and **Scale 2-Asthma Self-Efficacy**—and parents rate their knowledge and self-efficacy for both before/after or pre-/post- taking *The Asthma Knowledge Test for Parents.* This will permit the use of paired t-tests to compare pre- and post- mean scores for any significant difference, which would suggest, if a significant difference, that *The Asthma Knowledge Test for Parents* may serve as a brief online intervention that has the potential to significantly increase knowledge and self-efficacy from pre- to post-. Also, **the Scale 2-Asthma Self-Efficacy mean score provides for the second of two of the study's outcome variables variables for which significant predictors will be sought via regression analysis**.]

Please answer the following questions…

Scale 1: Asthma Knowledge (Pre- and Post-Taking *The Asthma Knowledge Test for Parents*) [1 topic, 2 questions—with 1 before and 1 after] **This is first of two study outcome/dependent variables.**

1-BEFORE I answered the above questions, I would **rate what I knew about asthma, about taking care of my child with asthma, and seeking the goal of achieving *asthma control*,** as follows:

1-Very Poor	2-Poor	3-Fair	4-Good	5-Very Good	6-Excellent

2-AFTER I answered the above questions, I would **rate what I knew about asthma, about taking care of my child with asthma, and seeking the goal of achieving *asthma control*,** as follows:

1-Very Poor	2-Poor	3-Fair	4-Good	5-Very Good	6-Excellent

Scale 2: Asthma Self-Efficacy (Pre- and Post-Taking *The Asthma Knowledge Test for Parents*) [3 topics, 6 questions—with 3 before and 3 after] **This is second of two study outcome/dependent variables.**

1-BEFORE I answered the above questions, I would **rate my level of confidence for taking care of my child with asthma, and helping my child achieve *asthma control*,** as follows:

0% Confident	20%	40%	60%	80%	100% Confident

2-AFTER I answered the above questions, I would I would **rate my level of confidence for taking care of my child with asthma, and helping my child achieve *asthma control*,** as follows:

0% Confident	20%	40%	60%	80%	100% Confident

3-BEFORE I answered the above questions, I would **rate my level of confidence for talking to my child about how to monitor (observe/notice) and manage (respond to, take care of) asthma,** as follows:

0% Confident	20%	40%	60%	80%	100% Confident

4-AFTER I answered the above questions, I would **rate my level of confidence for talking to my CHILD about how to monitor (observe/notice) and manage (respond to, take care of) asthma symptoms,** as follows:

0% Confident	20%	40%	60%	80%	100% Confident

5-BEFORE I answered the above questions, I would **rate my level of confidence for talking to healthcare providers/pediatricians about my child's asthma, and how to manage (respond to, take care of) their asthma,** as follows:

0% Confident	20%	40%	60%	80%	100% Confident

6-AFTER I answered the above questions, I would **rate my level of confidence for talking to a healthcare provider/pediatrician about my child's asthma, and how to manage (respond to, take care of) their asthma symptoms,** as follows:

0% Confident	20%	40%	60%	80%	100% Confident

PART XI: OPEN ENDED QUESTIONS ON ASTHMA-RELATED STRESS AND COPING STRATEGIES (OEQ-OARS-ACS-2)

[This tool reflects a common approach to mixed-methods studies conducted by the Research Group on Disparities in Health, RGDH—specifically providing open-ended questions that focus on stress and coping]

Lastly, please answer the following two open-ended questions, allowing you to freely share.

1-Please describe what have been the most difficult and stressful parts of caring for your child with asthma? Or, what has been the most difficult and stressful when it comes to helping your child achieve *asthma control*?

2-Finally, what are your best coping strategies, or most successful strategies, or best ways for helping your child achieve *asthma control*? Please share anything you discovered so other mothers/families can better help their child achieve *asthma control*.

END OF SURVEY. THANK YOU!

Appendix G

Analyzing Qualitative Data

The Research Group on Disparities in Health (RGDH) highly values mixed methods dissertations that combine quantitative and qualitative methods. Typically, a dissertation is rooted in three to four theories (e.g. stages of change, self-efficacy, diffusion of innovation) and surveys collecting quantitative data have a rationale in corresponding theory. Meanwhile, all surveys end with open-ended questions (1-3) that are analyzed for themes; some students use a qualitative data analysis package for this task. However, I recommend the following steps for analyzing qualitative data: Myth: you do not need to read all of your qualitative data Truth: you DO need to follow all these steps

START WITH YOUR FIRST QUALITATIVE RESEARCH QUESTION

1) ORGANIZE- copy and paste qualitative data from survey monkey into one file- -organizing by question asked
2) HIGHLIGHT - as you read it, highlight in yellow quotes that stand out--and, after you read about twenty answers, go back to the first highlighted yellow and in brackets at the end put an emergent theme:
3) CREATE ACTION PHRASES - ITALICIZE AND BOLD - the emergent theme in brackets should be an action phrase--such as perceiving the need for supervision/training or striving to achieve positive outcomes or pursuing objectives by taking action
4) LIST DOCUMENT FOR EMERGENT THEMES -as you continue to read beyond the first twenty answers, have a second document where you are copying and pasting your emergent themes--creating a LIST; as you read your twentieth to fortieth answer, start to just copy and paste the relevant emergent theme from your LIST, placing it in brackets where it applies
5) THEMES EXPAND TO ACCOMMODATE MORE DATA - feel free to elaborate on the emergent theme to accommodate the answers you see (twentieth to fortieth answers); for example, perceiving the need for supervision/training/new curriculum or striving to achieve positive outcomes/goals/highest potential, or pursuing objectives by taking action/engaging in advocacy
6) SEE HOW EXPANDED THEMES ACCOMMODATE ALL DATA - the new elaborated emergent themes now encompass ALL the examples (#1-20, 21-40)
7) CLASSIFY ALL DATA BY THEMES - continue to go through all of your data (examples 41-100) and only highlight in yellow where needed, and mostly copy and paste the emergent theme in brackets; put any NEW emergent themes in your second document where you are copying and pasting your emergent themes--creating a LIST
8) QUICKLY CONTINUE TO CLASSIFY ALL DATA BY THEMES - if you have a LOT of data, eyeball and read quickly examples (101-200) --searching for every place you can highlight in yellow a new emergent theme (e.g. feeling the focus is unnecessary/rebelling/not caring) --to place on your LIST; or, quickly copy and paste where the new emergent theme fits in (e.g. #104 reflects the theme of perceiving the need for supervision/training/new curriculum)
9) CREATE TABLE AND ORGANIZE BY REDUCED CATEGORIES THAT ENCOMPASS GROUPS OF THEMES: turn your final LIST of emergent themes (e.g. 20) into a TABLE; search for CATEGORIES OF THEMES that may accommodate 3-5 of your emergent themes (fit under it like an umbrella); organize the LIST of emergent themes so groups appear under the higher order CATEGORIES. For example, there may be just 3 categories of solutions, or strategies, or complaints might each encompass 3-4 themes.
10) ENTER FREQUENCY AND PERCENTAGE IN TABLE: go back and count the number of times each emergent theme appeared in your data; add to your TABLE n and % for number of times the emergent theme appeared--even as it it now under a CATEGORY in your table.
11) REPEAT PROCESS FOR THE NEXT QUESTION--NEXT BODY OF QUALITATIVE DATA Allow yourself to REPEAT your 3 categories of solutions, or strategies, or complaints which might each encompass 3-4 themes
12) Allow yourself to create a FINAL TABLE that organizes categories and themes.